VOL. 172, NO. 5 AMERICAN MAY, 1950

Gas Journal

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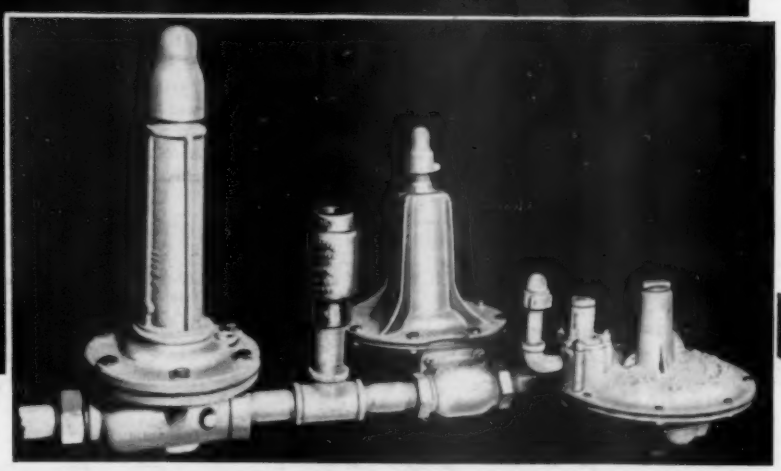

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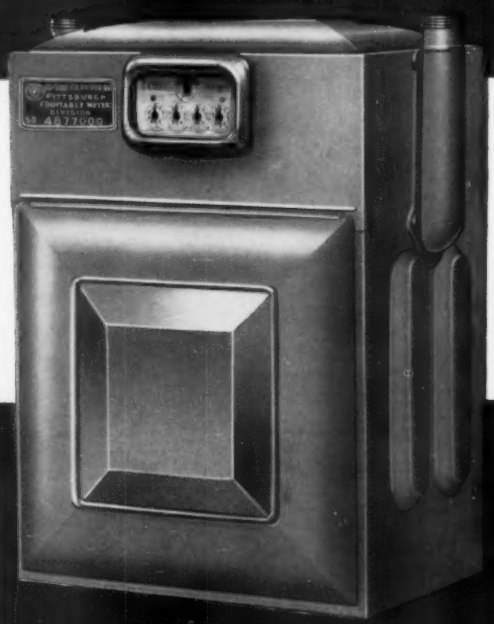

IT'S ECONOMICAL to anticipate the heavier loads that will accompany your conversion to natural gas. Now is a good time to specify Rockwell-Emco 10 lt tin meters for many new or replacement settings. You'll get much more capacity at little extra cost. And with a new 10 lt meter already on the job there will be no expensive and troublesome meter replacement when the load increases. Want facts and figures on this money saving idea? Just write the nearest district office.

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Model 10-300, capacity 300 cfh
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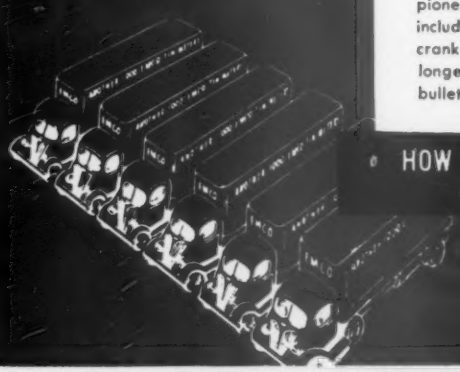

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* *Work is now in progress on contracted installations of these machines.*

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ALLIED CHEMICAL & DYE CORPORATION

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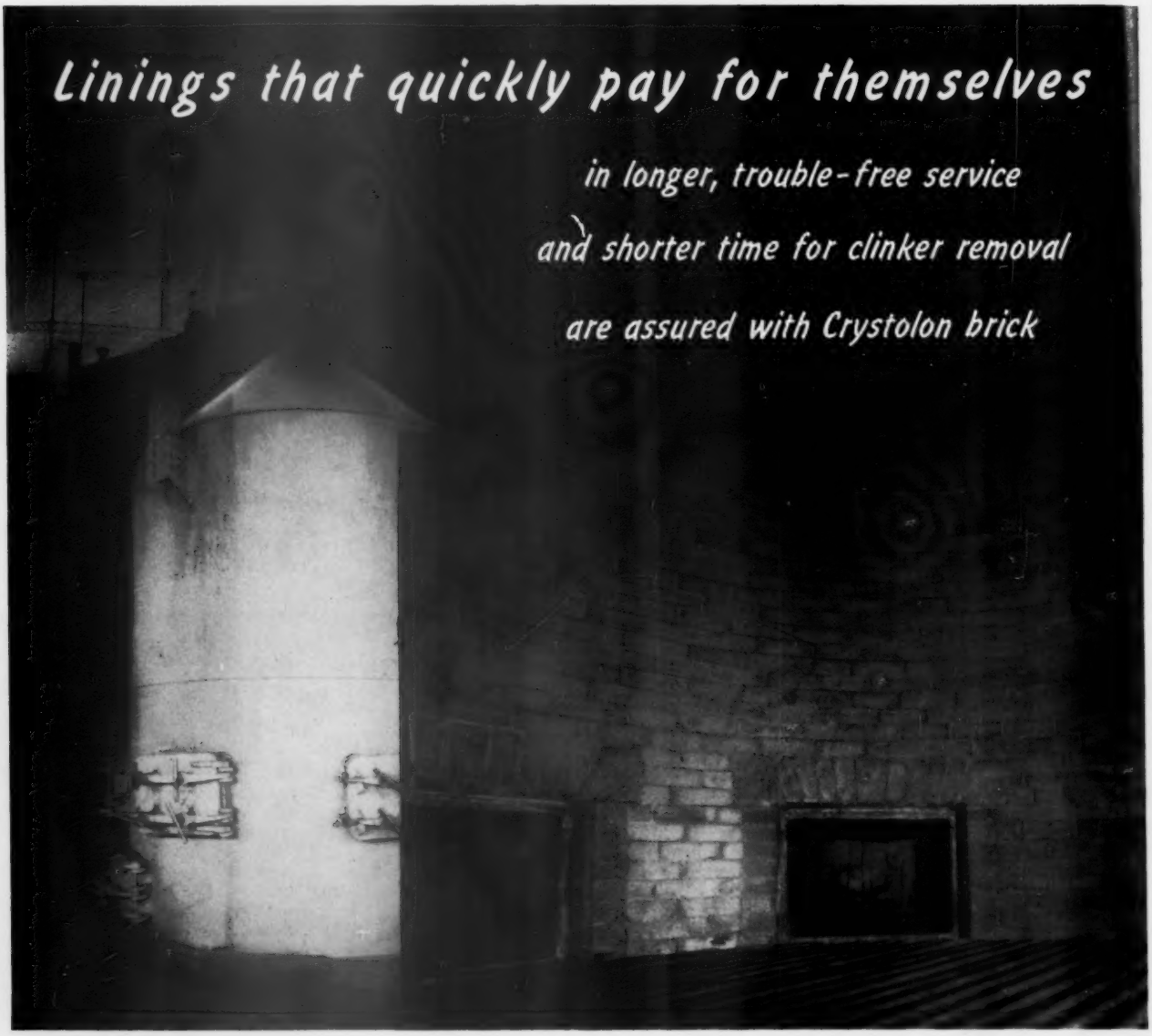
in longer, trouble-free service

and shorter time for clinker removal

are assured with Crystolon brick



In Plant after plant operators are finding that the purchase of a Crystolon Lining is an investment in long, trouble-free service and shorter "down-time" for cleaning. In many instances plant superintendents have reported that the Crystolon Brick installation paid for itself the first year. Made of top quality silicon carbide, Crystolon Brick always have these important qualities: (1) great refractoriness, (2) strong resistance to both the chemical and physical erosion of slag, (3) high resistance to abrasion and to clinker penetration. The hard, dense surface of Crystolon Brick prevents attack by slag and once the clinker ring is broken the remaining clinkers may be easily barred loose, leaving the Crystolon Lining smooth and unaffected for further long service. Thus cleaning costs are reduced, production is increased and the Crystolon Lining soon pays for itself.

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Without bursting strength—or, for that matter—without all of the strength factors listed opposite—no pipe laid 100 years ago in *city streets* would be in service today. But, in spite of the evolution of traffic from horse-drawn vehicles to heavy trucks and buses—and today's vast complexity of subway and underground utility services—cast iron gas and water mains, laid over a century ago, are serving in the streets of more than 30 cities in the United States and Canada. Such service records prove that cast iron pipe combines all the strength factors of long life with ample margins of safety. No pipe that is provably deficient in any of these strength factors should ever be laid in city streets. Cast Iron Pipe Research Association, Thos. F. Wolfe, Engineer, 122 So. Michigan Ave., Chicago 3.

CAST IRON PIPE

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Above: Five of the Cooper-Bessemer GMW engine-driven compressors in Michigan-Wisconsin Pipe Line Company's Guymon-Hugoton Station, showing units from scavenging, blower end. Each has 10 V-type power cylinders, is rated 2500 hp, and drives 3 compressor cylinders.

Shown above are five of the Cooper-Bessemer GMW V-angle compressors now at work in the new Guymon-Hugoton Gas Field Station of the Michigan-Wisconsin Pipe Line Company.

Despite the relatively small space they occupy, these five units alone provide a total of 12,500 compressor horsepower! It shows that *big* savings can be made today in the cost of foundations, buildings and installation by taking advantage of the extreme compactness, the high power-to-space ratio of these modern V-angles.

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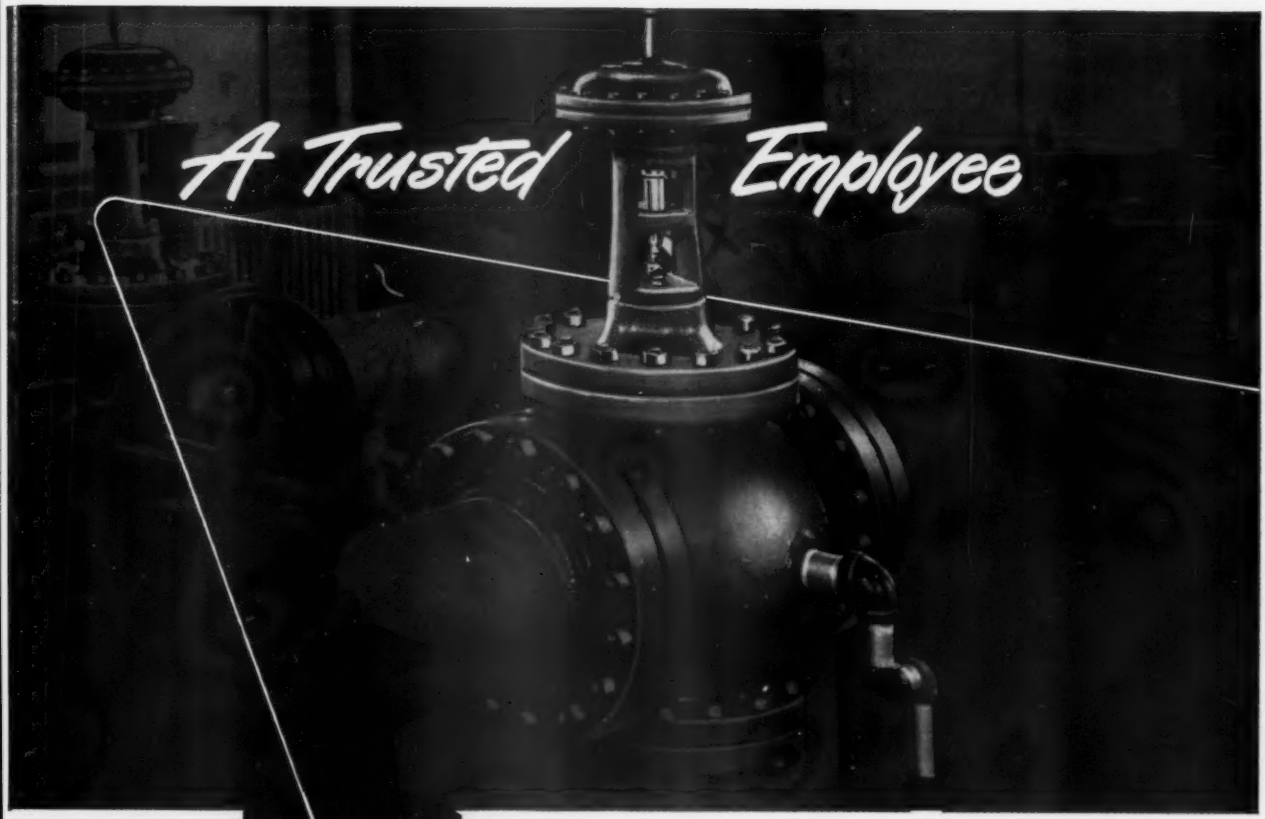

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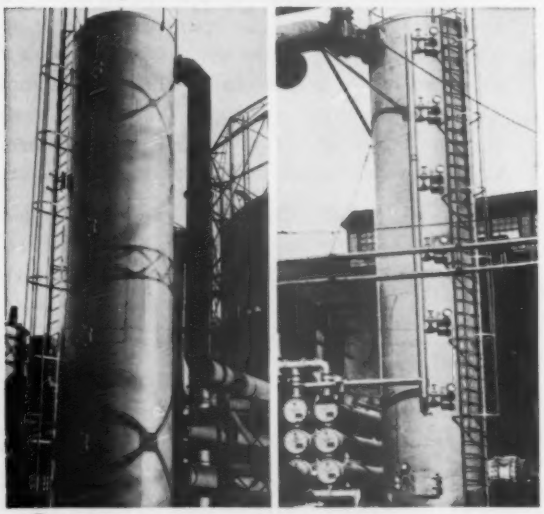

● Cooling Scrubbers and Condensers—Oil Scrubbers-Auxiliary Equipment

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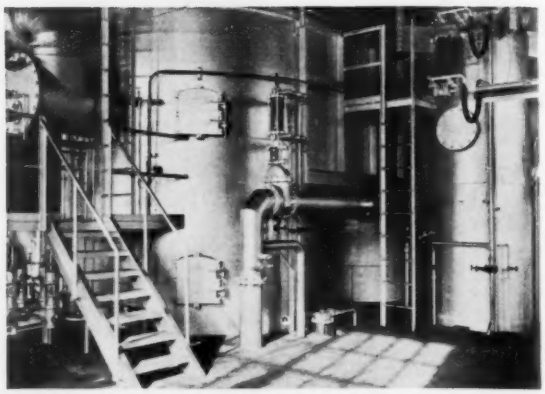
FOR THE GAS PLANT



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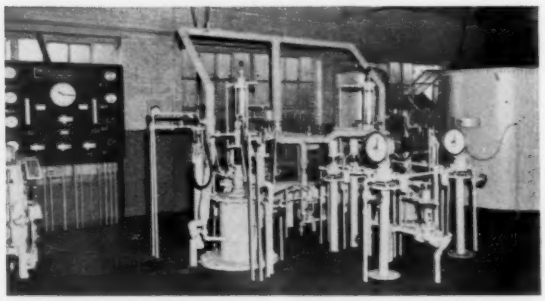
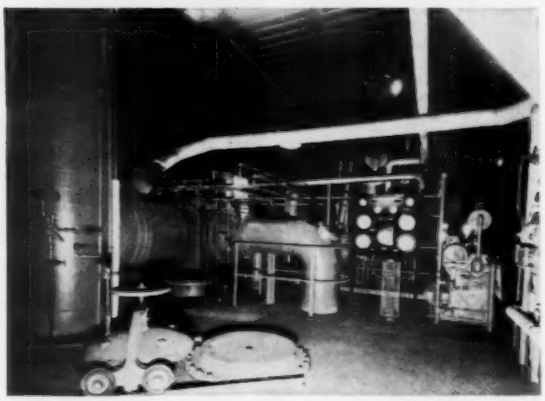


● Single and Twin Generator Oil Gas Sets for Stand-by and Peak Shaving. Various Methods Available for Conversion of Existing Equipment



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AMERICAN Gas Journal
ESTABLISHED 1859

VOLUME 172 MAY 1950 NUMBER 5

This month...

The lead article by John F. Falvey, "Northwest Hopes for Natural Gas . . ." on page 14, rounds out a staff written series that started with Natural Gas in New Pastures (November) covering the Atlantic seaboard and New England invasion and "Natural Gas Knocks at Southeastern Doors" (March) devoted to the Southeastern states. Right now the Pacific Northwest seems further from natural gas than any of the regions surveyed. But it is just a question of time—and Canadian politics—until this, the last frontier, is also invaded.

In the series vein, we might add that Kenneth R. D. Wolfe, on "Improved Pressure Control Methods . . .," page 38 writes one of a trio of articles on the technics of natural gas transmission and distribution, the first two of which, by P. H. Miller and Earle N. Armstrong appeared in April. The series will be reprinted by Malcolm W. Black, New York.

This May issue marks a full year of AMERICAN GAS JOURNAL under its new publishing and editorial direction. When we started we said we would rest our case, not on promises but on "the printed record as it monthly unfolds." A year later we can think of no promise to supersede that first one; and we can ask no other evaluation of whatever progress we have made than that which is shown by the record.

An alert young operating department employee of an extremely conservative gas utility complains that he is low man on the routing slip in his company. He gets a "read and pass on" copy of the JOURNAL only after it has been passed around among the brass for ten days or two weeks. We suggested that there is nothing about his plight that $3 of his own money wouldn't cure. Apparently the idea struck him as a trifle revolutionary for his environment; but he seemed to be giving it serious thought.

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Elliott Taylor · Editor

Howard F. Weeks · Associate Editor

Arthur Rohman · Western Editor **John F. Falvey · Financial Editor**

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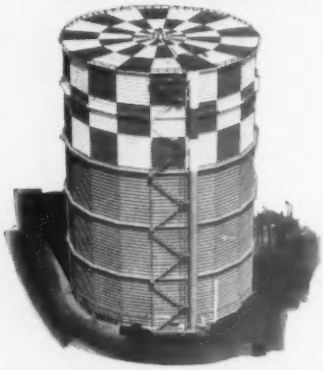

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Editorial:

The Flaw in AGA

THE final paragraph in the Chronology of the Natural Gas Industry, printed in this issue of AMERICAN GAS JOURNAL should indicate to every natural gas man in attendance at the Tulsa meeting the imperative and immediate necessity for a great deal more political awareness than the industry has displayed to date. It is ironical, but perhaps appropriate, that the most significant news of 1950 is the record of two major victories for expanding Federal regulation.

Gas men, particularly when they are assembled under one roof in a rip roaring convention, like to imagine themselves as all members of one big happy family, sharing common interests and working together for common goals. But when any individual or any branch of that family is set upon by the courts, or by Federal agencies, the others are prone to observe its efforts to obtain justice with the preoccupied disinterest of a Faro dealer watching a sucker lose his shirt.

The campaign of misrepresentation and distortion that led ultimately to the Presidential veto of the Kerr bill is the most recent case in point. We have accumulated half a basketful of clippings, couched in the Leland Olds idiom, in which columnists and Washington observers sweat blood from every pore as they described the unhappy plight of the consumer if natural gas prices in the field were left outside the purview of Federal regulation. Radio commentators joined in the chorus. But we heard not a word to indicate that the proscribed jurisdiction had, as a matter of fact, never even existed.

Whose responsibility should it have been to act as industry spokesman in this issue? What agency should have undertaken to initiate even the first step toward rebuttal, which would have been to establish an overall industry economics policy with respect to the bill? Obviously since there is only one national body that presumes to represent the entire gas industry, it should have been undertaken by the American Gas Association.

It may be argued that it would be well nigh impossible to reconcile the divergent viewpoints of the oil companies, biggest owners of natural gas reserves and classified as independent producers, with those of the pipe line corporations whose production is already under Federal Power Commission price regulation. And certainly the distributing utilities, who want to buy natural gas as cheaply as possible, do not always see eye to eye with the transmission companies who naturally seek the most advantageous price obtainable.

Yet the overall interests of everyone of these elements tend to become identical. They must all sell enough gas, at a price and for the type of use, that will insure the economic stability of their individual operations. What these prices may be, what terms and conditions of sale should obtain and the degree of regulation necessary are not, and should not be, subjects to be thrashed out in the blazing sun of political prejudice. In the final analysis, after all of the breast beating and name calling have subsided, calm and dispassionate economic analysis is the only tenable basis on which either government or management can plan for the future of natural gas.

The background study for such an analysis, and the release of the economic interpretations that would result, should be a major preoccupation of the American Gas Association. The Association has done a magnificent job in recent years in raising the standards of appliance building, through the testing and approving program of its laboratory; it has become keenly alert to the necessity for sales and promotion effort. It maintains an able and dependable statistical service. Its technical research program is unsurpassed.

But when it comes to coordinating all of these endeavors, and translating them into terms of inter-industry relationships and public policy, its members are left strictly on their own.

The organization chart of AGA should be expanded to include a bureau of economic research, and its activity should be planned and directed by the most competent economist obtainable. Until that step is taken the voice of the gas industry will continue to be, as it has been in the past, only the intermittent and often anguished moans of its members, as they are caught in the mighty squeeze of present day political, social and economic change.

Press Agents Dream

SOMETIMES the perspiring public relations man gets a break. Best of the month, we believe, was the day Westchester Lighting Co., suburban New York utility, inaugurated its new radio dispatch service, with service cars assigned by short wave to care for emergency calls. About mid afternoon an agitated female voice announced that the furnace door had blown open and her house was "full of fumes." The service car signalled by the dispatcher was just passing the customer's house when the call was received. The crew scrambled out and up to the door. Total elapsed time from the customer's call until their arrival, one minute flat. Then to tie it up into a real press agent's dream, there proved to be nothing wrong with the furnace, and the house was full of guests. The reputation for quick response earned by that call will take a lot of hustling to maintain. Westchester admits it was a wonderful start for the new service.

Elliott Taylor

Northwest Hopes for Natural Gas From Growing Alberta Reserves

By John F. Falvey

PLANS have been under way for more than two years to transport natural gas from the Canadian province of Alberta into British Colombia and the Pacific northwestern states of Oregon and Washington.

The initial application for the purpose was filed with the Federal Power Commission in February 1948, by Northwest Natural Gas Co., 120 Broadway, New York City.

Northwest Natural proposed a line with an initial maximum deliverability of 209,000,000 cu. ft. of gas a day, but with actual deliveries set at 153,424,000 cu. ft. daily operating at a 75 per cent load factor.

Although Northwest Natural's application is more than two years old, the entry of natural gas into the Pacific Northwest still seems to be at least many months away. Canadian opposition to the venture has been noticeable from the start. Most of it has been predicated on the expressed fear that Alberta natural gas reserves were not sufficient to take care of expanding local needs and requirements in addition to those of a large diameter transmission line.

Northwest Natural Gas Co. plans to gather its gas from Alberta fields through a subsidiary, Alberta Natural Gas Grid, Ltd.

For its transmission line into the United States the company has proposed two alternative routes. One would comprise 606 miles of 24 inch line from Kingsgate, British Columbia, across northern Idaho and into the cities of Portland, Ore., and Seattle, Spokane, Tacoma and Walla Walla, Wash., with 150 miles of 18 inch pipe going northward to Vancouver and Trail, B. C. The other proposal is for a 24 inch line to connect Kingsgate, Seattle and Spokane, with an 18-inch link from Seattle southward to Portland and northward to Vancouver, B. C., and a spur just inside the eastern Washington border heading northward to Trail, B. C.

Meanwhile other proposals to bring Alberta natural gas into Oregon, Washington and British Columbia have been put forth. Two other pipe line companies are now endeavoring to supply the natural gas needs of the northwest. One is Prairie Transmission Lines, Ltd., and the other is Westcoast Transmission Co., Ltd.

Acting in behalf of Prairie is Glen C. Wilton, a Toronto lawyer. He has interested residents of Edmonton, Alberta, in the project, thus imparting to it a local complexion.

So far as is known, Prairie has not indicated the proposed capacity of its line, nor the route but it is reported to be considering a route similar to that of Northwest Natural.

Westcoast Transmission plans a different route. It talks of running a 24-inch line through the Yellowhead Pass direct to Vancouver, B. C., whence a 22 inch line would go almost due southward to Seattle, Tacoma, Olympia, Longview and Vancouver, Washington and Portland. (Westcoast Transmission has stipulated its deliverability to be 165,000,000 cu. ft.)

Westcoast Transmission's President is Frank M. McMahon, and the company is said to have support of investment firms in New York, Boston and Canada.

The Hurdle

The greatest obstacle confronting all of the pipe line ventures is the guaranteeing of sufficient reserves to satisfy the long term needs of Alberta before gas can be taken from the Province.

Compounding the difficulties for Northwest Natural and for Prairie Transmission is the widespread opposition in Canada, especially in high government circles, to any pipe line venture which makes service to British Columbia and other Canadian areas appear to be secondary to serving markets in the northwestern sector of the United States.

Strength of this concerted opposition was evidenced in the action of the 21st Parliament at Ottawa which closed its first session last December 10 without granting incorporation to either Prairie Transmission or Northwest Natural Gas Company's subsidiary, Alberta Natural Gas Grid, Ltd. On 13 successive occasions members of Parliament successfully filibustered the applications.

Obtaining incorporation is only one of the steps which any prospective pipe line applicant must take, in Canada. It also must obtain a provincial export permit to transport Alberta gas to the United States. Hearings on export applications have been going on since January before the Alberta Petroleum and Natural Gas Conservation Board. This board does not have the power to grant export permits, but it will recommend the granting or refusing of them to the Alberta Cabinet.

To date, Westcoast Transmission Lines, Ltd., is the only pipe line applicant which has been incorporated, the organization date being April 30, 1949.

Hearings before the Alberta Conservation Board in behalf of Westcoast's export application have been going on for weeks and have now been adjourned to June 12.

Prior thereto, on May 29, the Alberta board will consider the export application of Northwest Natural Gas Co., which currently is making its second effort before Parliament to obtain incorporation.

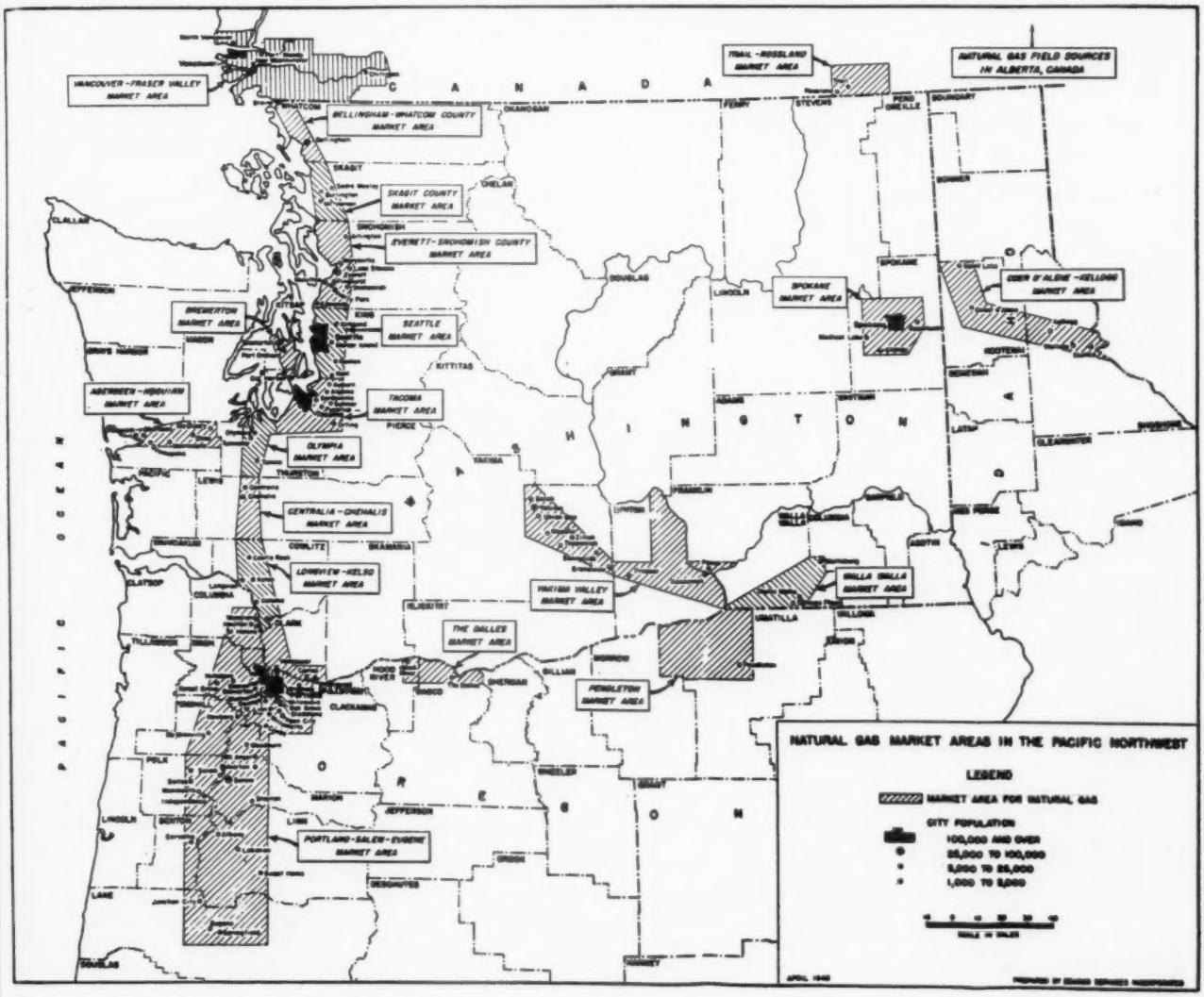
Action by Year End

Following these two hearings, the Alberta board will take no action until September 25 when it is due to hold another hearing on these export permit applications, with the Prairie Transmission Lines hearing to be held on October 9.

This will serve to postpone until possibly the 1950 year-end any report by the Alberta board to the Provincial Cabinet.

In addition to the important investment banking firms seeking a part in the financing of the various pipe line ventures, the array of oil firms owning substantial natural gas reserves in Alberta and prospecting for further supplies in the province is formidable.

Largest operator in Alberta is Impe-



Towns to be Served	No. of Customers	Present Btu Content	Present Annual Sales (in Mcf)	Estimated Market for Natural Gas in the 5th Year of Operation (Mcf) Domestic	Commercial	Industrial	Total Sales
Canada:							
Vancouver, B. C.	51,768	565	2,728,538	4,839,000	1,613,000	3,090,000	9,542,000
Other B. C. (A)	9,092	456.3-460	498,980	852,600	284,200	1,200,000	2,336,800
Total Canada	60,860		3,227,518	5,691,600	1,897,200	4,290,000	11,878,800
United States:							
Bellingham, Wash.	2,437	1,000	43,388	292,500	97,500	1,000,000	1,390,000
Everett, Wash.				313,700	104,567	1,000,000	1,418,267
Olympia, Wash.	15,806	501	1,107,973	141,300	47,100	410,000	598,400
Centralia-Chehalis, Wash.				120,000	40,000	42,000	202,000
Tacoma, Wash.				1,418,700	472,900	3,236,000	5,127,600
Seattle, Wash.	44,223	505	4,029,387	4,408,800	1,469,600	7,150,000	13,028,400
Kelso-Longview, Wash.	1,050	1,200	23,000	238,800	79,600	426,000	744,400
Camas-Washougal, Wash.	948	1,130	29,586	85,100	28,367	550,000	663,467
Other Washington	22,681	550 to 1,300	*830,637	175,000	58,333	—	233,333
Portland, Oregon	103,722	569.7	9,284,280	8,047,000	2,682,333	9,546,000	20,275,333
Other Oregon	11,024	550 to 1,000	*880,941	370,200	123,400	—	493,600
Total U. S.	201,891		16,229,192	15,611,100	5,203,700	23,360,000	44,174,800
Total	262,751		19,456,710	21,302,700	7,100,900	27,650,000	56,053,600

Note: (A) Including Kamloops, Hope and Princeton.
*Mcf of 1,000 Btu Gas.
Total annual fuel requirements of all industry in the area are estimated at the equivalent of 100 million Mcf of natural gas in the fifth year.

rial Oil Co., subsidiary of Standard Oil Co. of New Jersey. Second largest is reported to be Standard Oil Co. of California, which is functioning through a subsidiary.

A substantial owner of Alberta gas acreage, estimated to be around five million acres, is Bear Oil Co., an operating co-operative. This company is controlled by a number of other companies, Pacific Western Oil, Tidewater Associated Oil and Sunray Oil Corp., each holding 20 per cent; Pacific Petroleums, Ltd., 25 per cent; and Princess Oil Co. and the Frame interests of Canada owning 15 per cent. Sunray owns 17 per cent of the stock of Pacific Petroleums which in turn owns extensive additional acreage and a 25 per cent interest in Westcoast Transmission Lines.

Canadian arguments in favor of Westcoast and its Yellowhead Pass route to Vancouver and then southward are that:

1. $55 million more will be spent in Alberta and Canada than would be if the line went south and looped through the United States.

2. Alberta would have complete control over its natural gas resources at all times, guaranteeing that provincial needs would be served first.

3. Alberta would be the indisputable hub of the whole gas gathering system of the province and the supply centre for the whole north country for all time.

4. Natural gas would be brought to scores, and ultimately hundreds, of Alberta and B. C. communities not getting it now.

50 Year Reserve

Hon. N. E. Tanner, Minister of Mines and Resources of Alberta, made the flat statement last November that export of gas would not be permitted until it was assured that Provincial needs were covered for at least 50 years. This incidentally is the first specific Government commitment on its promise to protect Alberta consumers.

Evidence adduced at the Westcoast Transmission Line's hearings before the Alberta Conservation Board for approval of gas export appears to dispel any fears that gas reserves of the Province are insufficient to take care of both local needs and requirements for a proposed pipe line to the United States. Dr. A. W. Nauss, testifying in behalf of Westcoast, estimated at the hearings in January that Alberta had at that time 5.95 trillion cu. ft.

The natural gas needs of Alberta for 50 years were estimated at approximately 2.8 trillion cu. ft., and requirements of the Westcoast Transmission line for 30 years were set at nearly two trillion cu. ft.

After hearings actually had started on Westcoast's export application, however, the two local Alberta utilities which in December 1948, had estimated needs of the Province in 1960 at 70 billion cu. ft. a year sharply revised their estimates to place 1960 natural gas requirements of the Province at 78 billion cu. ft. This is an increase of more than 11 per cent above their original estimate in little more than one year.

They explain this change by pointing out that demand for natural gas in the Province has jumped at a rate far faster than anticipated. Canadian Western Natural Gas Co., Ltd., operating in the Calgary area, now estimates gas demand on its system in the current year at 4.4 billion cu. ft. above 1948. In its December 1948, estimate it had expected that gas demand would increase 5.5 billion cu. ft. by 1960.

The experience of Northwestern Utilities, Ltd., serving Edmonton, is reported to be similar.

If these revised estimates of the companies are accepted, the amount of natural gas to be reserved for Provincial use would have to be increased to 3.5 trillion cu. ft., or 26 per cent more than previously had been considered necessary.

Fears that Alberta natural gas supplies are inadequate for both domestic and export purposes are subsiding, however, as a result of increasingly optimistic appraisals of the gas reserve situation in the Province.

Most recent estimates range as high as seven trillion cu. ft., and all indications point to realization of a much higher figure. As early as March 1949, Dr. G. S. Hume of Ottawa stated that: "Potential reserves will exceed many times those now existing and proven." His opinion was corroborated by geologists Albert D. Brokaw, of New York, and W. C. Spooner, of Shreveport.

A more concrete estimate was made by Dr. T. A. Link of Calgary who said: "It is reasonable to assume that in the very near future Alberta should develop about 28 trillion cu. ft. and that the reserves developed in the province within the next five years would be not less than ten trillion cu. ft. At present consumption rate, one trillion cu. ft. would last Alberta more than 20 years."

The prediction of Dr. Link was supported very strongly by Dr. Nauss in January of this year when he said: "If the success of exploration activities continue in the future as they have in the past, and there is every reason to believe they will, . . . we can expect to find something like 50 trillion cu. ft. of gas in Alberta."

Whichever prospective pipe line company succeeds in obtaining permission to transport natural gas from Alberta to the United States, it seems apparent the gas will have to be obtained from Alberta Inter-field Gas Lines, Ltd., a company which has been formed by Canadians and will be operated by Canadians to gather the gas before it goes into any export pipe line. This gathering system will be tied in with the local Alberta utilities and the venture is so set up that control could not pass out of Canada. Thus, to all intents and purposes, the interests of Dominion residents, and of Albertans in particular, will be amply protected.

Information now coming from Alberta is to the effect that at least 18 months will elapse before any one of the proposed pipe line companies can obtain a permit to export gas. Adding another two years for actual construction and proving up of the line would mean that it could not possibly go into operation until some time in 1954. This would make 1955 the likely first full year of operations.

Oil Price Is Factor

The delay in bringing Alberta gas into the Pacific Northwest might not be so adverse a development as it would seem at first blush, however, because of the price disparity in favor of oil which now prevails in the territory. This is important in that it affects the ability of the pipe line gas supplier to contract for important "off the line" industrial sales.

Bunker "C" fuel oil is now selling in Seattle for only $1.55 a barrel, compared with $2.45 a barrel early in 1948 when an Alberta to U. S. natural gas pipe line was first broached by Northwest Natural Gas Co. Similar decreases are reported to have occurred elsewhere throughout the northwest.

At present fuel oil prices natural gas would have to sell at 24 cents per Mcf to be competitive with oil, disregarding any advantages in burning efficiency.

Northwest Natural Gas at the time of its original application two years ago had indicated a city gate rate for gas ranging up to approximately 36 cents per Mcf in the Northwest. Increased costs of construction and likely higher prices for gas in the field suggest that this price now would have to be raised somewhat. The company has not given a revised figure but presumably will do so in its hearings before the Alberta Conservation Board scheduled to start on May 29.

Westcoast Transmission in its testimony recently concluded said that the cost to carry gas to Vancouver would be 29.2 cents per Mcf (which includes 5.9 cents for gathering and 23.3 cents to transport from Edmonton to Vancouver) and that it will cost an additional 6.4 cents for transmission to the United States. This would make a to-

(Continued on page 59)

Selling Idea of the 'Gulf South' Is Job Undertaken by United Gas

MILLIONS by now are familiar with the name "Gulf South," copyrighted by one of the world's largest handlers of natural gas to describe the rich, fertile and colorful five-state area in which it operates.

In a comprehensive effort to publicize this territory, United Gas Pipe Line Co. has carried on one of the longest sustained programs of industrial development advertising ever conducted by a single firm.

On June 26, 1939, key executives and other employees of United Gas were summoned to an industrial development conference at the headquarters offices, then located in Houston. N. C. McGowen, President of the firm, unveiled plans for United Gas to launch a new campaign in its role as a good citizen of the territory.

Mr. McGowen reviewed the individual and collective responsibilities United Gas employees and the company as a whole had assumed in cooperative community efforts to attract new industrial plants. He pointed out, however, that industries usually had sought out the territory and sold themselves on it without much sales effort on the part of the Gulf South residents. He said people in other sections of the country recognized opportunities in the Gulf South that we took for granted.

Under President McGowen's plan, United Gas desired to reach those who were interested in expanding their businesses in new territory and those who had money to invest in new businesses.

Thus, the Gulf South industrial development advertising program was launched in several publications that have a large readership among the nation's industrialists. The first full-page advertisement was captioned simply, "The Gulf South Invites Industry," and appeared in July 1939, in *Time, Business Week, Dun's Review* and *Manufacturers Record*. The *Wall Street Journal* was later added to the schedule.

The name "Gulf South" was coined because it was felt that it best identified and described the area in which United Gas Pipe Line Co. operates. This includes the whole stretch of country from the Rio Grande and Panhandle of Texas down to the Gulf Coast of Florida, covering much of Texas, Louisiana, Mississippi, the southern part of Alabama and the northwestern section of Florida.

Since the initial Gulf South national advertisement appeared in July 1939, United Gas has run nearly 150 advertisements designed to attract industry to the flourishing coastal area.

Up until 1948, the advertisements featured the area as a whole. A "broad brush" was used to paint the industrial advantages of the richest and fastest growing section of the country. In 1948, a "finer brush" was used to show the advantages of each particular section of the Gulf South served by United Gas, such as East Texas, North Louisiana, Mississippi Gulf Coast, etc.

The series inaugurated in 1949 went into even more detail. Each of the 400 communities served by United Gas either directly or indirectly was mentioned in the advertisement of its respective geographical section.

A few weeks prior to publication of each advertisement, through local managers or representatives from district, division or general headquarters offices, United Gas conducted a "merchandising" program in each community to be publicized. United Gas employees appeared at civic club luncheons, called on local government officials and business men of the communities, or wrote letters to prominent citizens who were not seen in person. They gave advance notice of the appearance of the advertisement, told of the Gulf South program and distributed advance prints of the scheduled advertisement. Window and counter displays were set up in local United Gas or other distribution company offices.

Each newspaper was provided with a news release several weeks prior to publication of the advertisement mentioning the community in which it was located. Considerable editorial comment was received because industrial development has become a leading project of the leadership of communities throughout the Gulf South. Some local newspapers voluntarily and without charge reprinted the advertisement mentioning their communities. One town scheduled a page advertisement of its own opposite that of United Gas in one of the national publications.

The latest in the series of institutional advertisements

The Gulf South advertising program already has entered its eleventh year and plans are being made now for the 1950-51 series in *Time, Newsweek, United States News, Business Week, Manufacturers Record* and *Wall Street Journal*. The new series will employ some very impressive statistics showing the almost miraculous growth of the Gulf South and will continue to tell of the advantages awaiting industry in this modern-day mecca.

While not taking any major direct credit for the industrial growth of the area, United Gas will point out that in the four years since the war, private

industry invested one out of every six of its construction dollars in the Gulf South. That's four times the industrial construction in all New England and many millions more than that of New York, Pennsylvania and New Jersey combined. In addition, the Gulf South has been selected as the location for one-fourth of all proposed industrial construction announced to date.

W. E. Wilson, United Gas public relations director, frankly states that the firm's program is not based on altruism.

(Continued on page 56)

Attendance of 825 at Distribution Conference Breaks All Previous Records

As it has at all gas convocations in recent months, the theme of natural gas dominated the 1950 Distribution, Motor Vehicle and Corrosion Conference held under the auspices of the Operating Section of the American Gas Association in Detroit April 3, 4 and 5. A total registration of 825 operating gas men boosted the attendance to a new record high for this annual affair, and created a problem in handling the unexpectedly large turnout.

The meetings were divided into general sessions, luncheon conferences and parallel meetings, each one of which revolved around a central theme of interest to the specialists in attendance.

The general sessions, held during the mornings, were heavily weighted with discussions and papers on the introduction of natural gas into manufactured gas systems. In the main, participants were representatives of companies throughout the nation that have completed their conversions from manufactured to either a mixed gas or a straight natural gas operation.

The first panel discussion, "Experience with Natural Gas in a Mixed Gas System," was moderated by C. S. Gold-Smith, whose company—Brooklyn Union—is preparing to receive its first natural gas within a few months. Participating in the talks and lending the benefit of their experience were Lester J. Eck, Minneapolis Gas Co.; Martin I. Mix, The Peoples Gas Light and Coke Co., Chicago; W. R. Fraser, Michigan Consolidated Gas Co., Detroit, and H. B. Noyes, Washington (D. C.) Gas Light Co. The questions and answers dealt with odorization, oil fogging, advance conditioning of manufactured mains and regulator stations to receive natural gas, effect of natural gas on meter diaphragms, and similar distribution problems.

Other experiences were related in technical detail in subsequent sessions. John C. Taylor, Michigan Consolidated Gas Co., described how Detroit increased its distribution system capacity to supply 100,000 new space heating customers by stepping up distribution system pressures and installing service regulators ahead of customers' meters. R. H. Bussard, of Washington Gas Light Co., spoke on "Conversions as They Affect Work on Consumers' Premises," outlining the service difficulties in the form of consumer complaints after a conversion, and explaining how Washington met the problems that arose. F. G. Sandstrom, Consolidated Edison Co., New York, described the design, route and construction of the line across Manhattan Island, through which five gas companies in the New York City area will receive natural gas from a connection with the Transcontinental Gas Pipe Line Company's line at the Hudson River. The companies operate the line under a New York Facilities Agreement, whereby each company pays a proportionate share of the maintainance cost, based on the amount of gas taken from the line.

V. F. Bittner and E. G. Campbell, of Chicago, and F. J. Hall, of Detroit.

The Philadelphia Gas Works Co. routine for eliminating overloads of service calls at the opening of the heating season was the topic of a paper prepared by C. S. Hazel of that company. The system employed is designed to persuade customers to allow their pilot lights to burn all summer, and test their heating equipment or request lighting service before August 20, under a penalty of a lighting charge of $2.50 if service is requested later than that date.

Further consideration of the service problem was contained in a study made of sixteen companies and presented by S. E. Critchfield, Southern California Gas Co., Los Angeles. The investigation concerned itself with service order load balancing through organized dispatching routine.

Other operating complexities were discussed under various headings in the luncheon conferences held daily. Among these were: Distribution Design and Development, with W. P. Dick, Columbia Engineering Corp., Columbus, Ohio as chairman; Meters and Metering, under G. K. Bachmann, Public Service Electric and Gas Co., Newark, N. J.; Construction and Maintainance, J. A. Whelpley, Cincinnati Gas & Electric Co., chairman; and Work on Consumer Premises, J. M. McCaleb, Citizens Gas and Coke Utility, Indianapolis, presiding.

Corrosion considerations were opened with a paper by A. B. Lauderbaugh, The Manufacturers Light and Heat Co., Pittsburg, explaining in simple terms the principle of galvanic action, and how its corrosive effect on pipe can be overcome by the use of expendable metals connected by insulated wire to the line. A study by T. W. O'Brien, Consumers Power Co., Jackson, Mich., described the experience of his company in using magnesium ribbon for this cathodic protection. A luncheon meeting, with Sidney E. Trouard, New Orleans Public Service, Inc., as chairman, went into details in considering such topics as: insulated joints; galvanic anodes; rectifiers and cathodic protection.

A lengthy paper by Robert J. Kuhn, consulting engineer, New Orleans, described the cathodic protection of the 840 mile Texas Gas Transmission line from Texas to Ohio. Due to the fact that the line is welded into a continuous tube, passing through every kind of soil formation, it is cathodically protected for the entire distance.

The motor vehicle phase of the conference dealt with fleet operation and maintainance, covering a wide variety of subjects, among which were: generating and electrical power equipment; shop safety; repair shop design and body construction.

Chairmen of the several AGA committees that planned and directed the entire conference are: F. J. Hall, Michigan Consolidated Gas Co., Detroit, distribution; J. L. Coyne, Rochester Gas and Electric Co., motor vehicles; Sidney E. Trouard, New Orleans Public Service, Inc., corrosion.

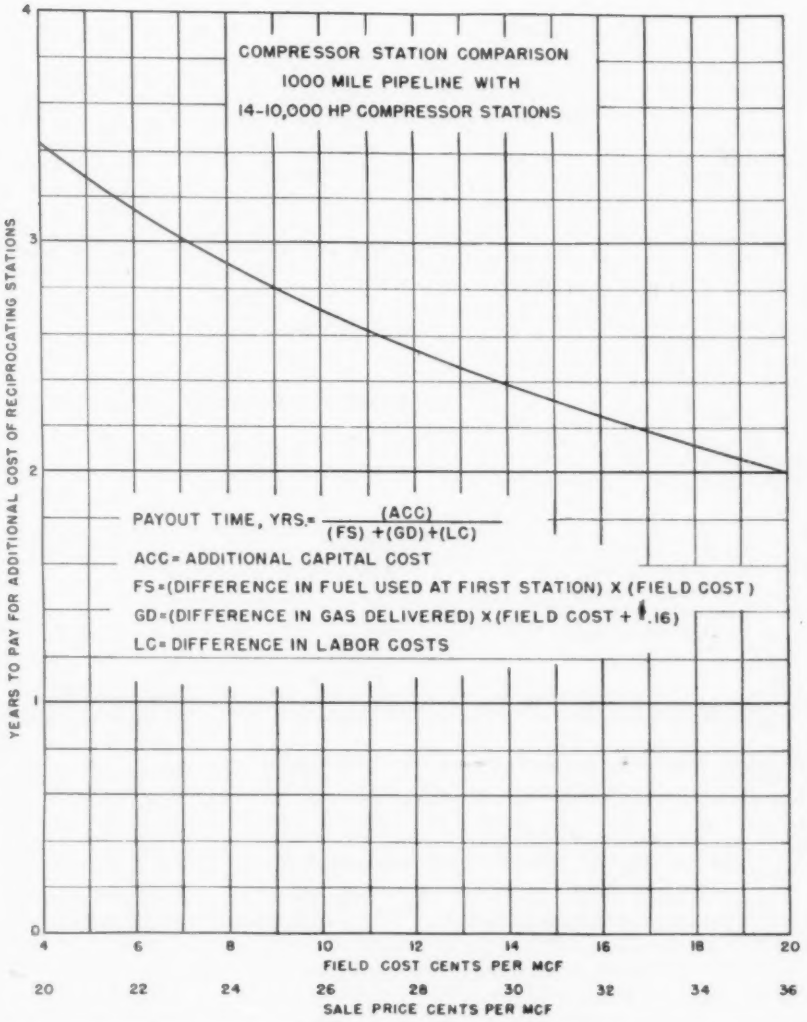
L. J. Eck, Minneapolis; Frank Lamb, Washington; C. S. Goldsmith, Brooklyn; and W. R. Fraser, Detroit.

The operating section of the association, under which the conference committees function, is headed by E. G. Campbell, The Peoples Gas Light and Coke Co., Chicago, with E. R. Van Vliet, New York and Richmond Gas Co., Staten Island, N. Y. as vice-chairman. A. Gordon King, AGA staff member, is secretary.

Calculations Show Long Term Economy Of Reciprocating Compressor Use

By Robert M. Poe
Chemical Engineer

Right:
Fig. 1


COMPRESSOR STATION COMPARISON
1000 MILE PIPELINE WITH
14-10,000 HP COMPRESSOR STATIONS
YEARS TO PAY FOR ADDITIONAL COST OF RECIPROCATING STATIONS
PAYOUT TIME, YRS.= (ACC) / (FS)+(GD)+(LC)
ACC= ADDITIONAL CAPITAL COST
FS=(DIFFERENCE IN FUEL USED AT FIRST STATION) X (FIELD COST)
GD=(DIFFERENCE IN GAS DELIVERED) X (FIELD COST + .16)
LC= DIFFERENCE IN LABOR COSTS
0
1
2
3
4
4 6 8 10 12 14 16 18 20
FIELD COST CENTS PER MCF
20 22 24 26 28 30 32 34 36
SALE PRICE CENTS PER MCF

THIS study was made to obtain a comparison of first cost and operating expense between reciprocating gas engine compressors with heat recovery on exhaust and jacket water, and steam turbine driven centrifugal compressors. On the basis of this study, the centrifugal compressor station has a lower first cost. However, the savings resulting from lower operating costs of the reciprocating compressor station would pay for the additional capital investment in about two or three years, depending on the price paid for gas. These conclusions are demonstrated in Table I and Fig. I.

In recent years considerable interest has been shown by natural gas transmission companies in the use of centrifugal compressors for pipe line compressor stations due to the lower capital investment required for this type of equipment. One difficulty encountered in the use of centrifugal compressors is the choice of prime mover. The cost of electric power is usually too high to make the use of electric motors economical. At present the efficiency of gas turbine driven centrifugal compressors is not as high as that obtained by reciprocating gas engine compressors. The cost of gas engine driven centrifugal compressors is higher than that of gas engine reciprocating compressors. The use of steam turbine drive is the remaining possibility. This study was made to compare the cost of reciprocating gas engine driven compressor stations, using heat recovery from the exhaust and jacket water, with steam driven centrifugal compressor stations.

As a basis for calculation, a hypothetical 1000 mile, 30" od transmission line was chosen. The gas quantity through the first station of the line was assumed to be 545 MMscfd, 0.60 specific gravity, 1.30 ratio of specific heats and 70°F temperature. The discharge pressure of each station was chosen as 800 psig.

Table 1—Summary of Compressor Station Comparison

Item	Reciprocating Station	Centrifugal Station
1. Gas quantity through 1st station	545 MMcfd	545 MMcfd
2. Length of line	1000 miles	1000 miles
3. Line diameter	30" O.D.	30" O.D.
4. No. of stations	14	14
5. Compression ratio/station	1.39	1.39
6. Horsepower per station	10,000	9716
7. Cost per station	$ 1,987,421	$ 1,641,231
8. Total cost of 14 stations	$27,823,894	$22,977,234
9. Operating labor cost per day for 14 stations	$2,810	$3,458
10. Fuel used per day for 14 stations	23,483,160 cfd	40,639,264 cfd
11. Gas delivered at end of line	523,233,397 cfd	507,358,618 cfd
12. Gas efficiency of station	35.7%	19.8%

Table 2—Cost Analysis Reciprocating Station

Case I—30" od pipe 0.325" thickness 29.350" id. 14 stations each having 1—2500 hp & 3—2000 hp gas engine driven compressors with heat recovery on exhaust and jacket water driving a turbine and 1500 hp centrifugal compressor

Cost of Station

3—2000 hp gas engine driven compressors @ $67.70/hp	$ 406,200
1—2500 hp gas engine driven compressor @ $67.40/hp	168,500
8—Air intake filters, 2 filters per unit @ $526.00 each	4,204
4—Flywheel guards @ $165.00 each	660
1—Motor driven water pump @ 1100 gpm, 65' head @ $280.00 ea.	280
3—Motor driven water pumps @ 850 gpm, 65' head @ $270.00 ea.	810
1—Switchboard	600
1—Motor driven air compressor	970
3—Starting air receiver @ $340.00	1,020
4—Engine foundations 1—107 cu. yds. 3—91 cu. yds. @ $45/yd.	17,100
1—Condenser dry cooler & coils & fans	88,855
1—Auxiliary engine & generator 350 hp & 265 kw	38,000
3—Condensate pump & water feed 55 gpm & 100' hd. @ $209.00 ea.	627
4—Waste heat boilers, separators, hot well @ $18,390 ea.	73,560
1—Turbine, centrifugal compressor & bedplate (1500 hp)	75,000
1—Oil reclaimer	2,000
1—Vacuum pump	2,000
1—Turbine & centrifugal foundations 5 yds. @ $45/yd.	225
Main building & foundations, piping, wiring & other construction @ $60.00 per hp	600,000
Auxiliary building, concrete work, piping & wiring @ $75.00 per hp	26,200
Freight 10,126.10 x 2.17	21,974
Sub Total	$1,528,785
Add 30% for engineering, insurance, workmen's compensation and unaccounted for items (1,528,785 x 0.30)	458,636
Total	$1,987,421

Operating Costs (Based on 10,000 hp)

Repair labor cost	$0.38/hp/yr
Repair material cost	1.26
Operating labor cost	3.78
Supplies other than maintenance mat'l	1.70
Building maintenance	0.21
Total	$7.33/hp/yr

$$\text{Cost per day} = \frac{(10{,}000)\ (7.33)\ (14)}{365} = \$2810 \text{ per day}$$

Table 3—Cost Analysis Centrifugal Station

Case 2—30" od pipe 0.325" thickness 29.350" id. 14 stations each having 3 steam turbine driven centrifugal compressors

Cost of Station

3—Centrifugal compressors with turbines (9716 hp)	$ 359,000
2—Gas fired steam boilers (4500 # Hr 400 psig 750°F ea.)	156,000
3—Condenser units (dry cooler/coils/fans)	249,150
2—Condensate pumps & turbines (80 hp ea. @ $75/hp)	12,000
1—Vacuum pump	2,000
1—Steam turbine driven auxiliary generator (20 hp)	2,500
2—Instrument panels	1,200
—Instruments	15,000
3—Compressor foundations 12 cu. yds. @ $45/yd.	540
Main building & foundation, wiring, piping & other construction @ $45.00 per hp	437,220
Auxiliary building, concrete work, piping & wiring	25,000
Freight	2,875
Sub Total	$1,262,485
Add 30% for engineering, insurance, workmen's compensation & unaccounted for items.	378,746
Total	$1,641,231

Operating Costs (Based on 9716 hp)

Repair labor cost	$0.39/hp/yr
Repair mat'l cost	0.60
Operating labor cost	6.12
Supplies other than maintenance mat'l	1.95
Building maintenance	0.22
Total	$9.28/hp/yr

$$\text{Cost per day} = \frac{(9716)\ (9.28)\ (14)}{365} = \$3458 \text{ per day}$$

Table 4—Fuel Consumption Comparison

	Reciprocating Station cfd	hp	Centrifugal Station cfd	hp
1	546,716,557	8590	547,997,882	9716
	1,716,557		2,997,882	
2	545,000,000	8564	545,000,000	9663
	1,704,500		2,983,194	
3	543,295,500	8538	542,016,806	9610
	1,699,421		2,968,307	
4	541,596,079	8511	539,048,499	9557
	1,694,356		2,953,496	
5	539,901,723	8485	536,095,003	9505
	1,689,307		2,938,758	
6	538,212,416	8458	533,156,245	9453
	1,684,273		2,924,094	
7	536,528,143	8432	530,232,151	9401
	1,679,254		2,909,502	
8	534,848,889	8406	527,322,649	9349
	1,674,250		2,894,984	
9	533,174,639	8380	524,427,665	9298
	1,669,260		2,880,538	
10	531,505,379	8354	521,547,127	9247
	1,664,286		2,866,164	
11	529,841,093	8328	518,680,963	9196
	1,659,326		2,851,862	
12	528,181,767	8302	515,829,101	9145
	1,654,382		2,837,631	
13	526,527,385	8276	512,991,470	9095
	1,649,452		2,823,470	
14	524,877,933	8250	510,168,000	9045
	1,644,536		2,809,382	
Gas Deliv.	523,233,397		507,358,618	
Fuel Used	23,483,160		40,639,264	

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Maxim Silencer Co.
Terry Steam Turbine Co.

To simplify the calculations it was assumed that all compressor stations would be alike and no gas withdrawals would be made along the length of the line except for station fuel. Using the above data and standard pipe line formulas, it was calculated that 14 compressor stations of approximately 10,000 horsepower each would be required.

Case I—Reciprocating Gas Engine Compressors

For economy it is desirable to have as few compressor units per station as possible since fewer operating personnel and less building and piping are required. There must be, however, a sufficient number of units to maintain a substantial percentage of the throughput of the pipe line when one unit is shut down for repairs.

The recovery of the waste heat from the compressor engine exhaust and jacket water is accomplished by the use of a waste heat boiler which produces 20 psia, 525°F steam. This steam is used in a steam turbine, operating condensing at 28 inches of mercury vacuum,

driving a centrifugal compressor. The centrifugal compressor then acts as a booster on the suction of the reciprocating compressors.

Calculations were made to determine the useful work that could be obtained from the waste heat of various sizes of reciprocating units. From these calculations, it was possible to choose a combination of standard compressor units which would furnish the necessary 10,000 horsepower when the additional horsepower from the heat recovery was included. One 2500 hp and three 2000 hp reciprocating units were chosen, with the centrifugal compressor supplying the remaining 1500 hp.

Case II—Steam Turbine Driven Centrifugal Compressors

A major assumption for this type of station is that sufficient suitable water could be obtained for boiler feed water. This assumption was made for this study.

The selection of centrifugal compressors for this type of station was based on having three units in series per station, so designed that during the short periods when one unit was down for repairs, the remaining two units could be operated at a higher speed to maintain the full output of the station. It is realized that during such periods of higher speed operation, the two units would not be operating at peak efficiency. However, since the expected down-time of the centrifugal compressor units is very small, the losses entailed by short periods of off peak efficiency operation are much smaller than the cost of standby equipment that would be idle 95 per cent or more of the time.

The turbines were selected to operate with 400 psig, 750°F steam condensing to 25 inches of mercury vacuum. This steam quality was selected to give a high turbine efficiency without excessive cost of boiler installation. To minimize the problem of obtaining condensing water for the station, it was assumed that the exhaust steam would be condensed by air coolers.

Basis of Cost Estimates

Cost quotations were obtained from manufacturers for all the operating equipment for the compressor stations. Estimates were made of the construction costs based on the cost of similar construction by other companies. These cost figures for the two types of stations are presented in Tables 2 and 3. No attempt was made to include the cost of personnel housing, water supply, land, automotive equipment, etc., since these items would be a matter of choice and local condition at each station. The labor costs of operation were determined from the averages of costs reported by several operating gas pipe line companies for their various classifications of labor.

The fuel consumption of each station was calculated on the horsepower requirement for the compression of the gas plus the necessary auxiliaries. A tabulation of these quantities by stations, for both types of stations, together with the amount of gas delivered at the end of the line, is shown in Table 4.

Since it was assumed that 545 MMcfd of gas would be pumped through the first station in each case, a fuel saving was allowed for the first reciprocating station amounting to the difference in fuel used in the first stations for the two cases. The fuel savings of the remaining reciprocating stations over the corresponding centrifugal stations resulted in an increased gas delivery at the end of the line having the reciprocating compressor stations. This increased gas delivery was also allowed as a fuel saving for the reciprocating compressors. The total dollar value of the above two gas savings was applied against the amortization of the increased first cost of the reciprocating stations.

Summary

Under the conditions hypothecated in this study, the following comparison can be made from the figures shown in Table I:

1. An additional capital investment of $4,846,660 is required for 14 reciprocating stations.

2. The reciprocating stations use 17,156,104 cu. ft. less fuel gas per day over the length of the pipe line. The first reciprocating station uses 1,281,325 cu. ft. less fuel gas per day than the first centrifugal station. The dollar saving for this gas was computed by multiplying the quantity of gas by the field price of the gas.

3. The reciprocating stations deliver 15,874,776 cu. ft. more gas per day at the end of the line. Since this gas would otherwise be used as fuel for the line, its value at the end of the line was taken as the selling price of the gas. This selling price would be the field price plus $0.16/Mcf.

4. Reciprocating stations show a lower operating labor cost amounting to $648 per day.

The total daily savings available from the use of reciprocating compressors, in terms of the field price of gas, were used to determine the time required to amortize the additional capital investment. These amortization times are plotted against field price of gas in Fig. I.

An additional factor (not included in these calculations) favors reciprocating gas engine compressor stations. This is the recently developed concept of the unitized compressor station. In this type of station, each compressor unit drives its own auxiliaries (jacket water pumps, water cooler fans, etc.). This design results in a first cost saving in piping and motors for these auxiliaries.

Eight Labor Contract Settlements Are Made

The Bureau of Labor Statistics announced several utility labor contract settlements within recent weeks:

The Equitable Gas Company, Pittsburgh, granted a five cent per hour increase to 400 of its employees. In addition the company granted a $50 retirement bonus and a $15 pension increase bringing pensions to $75 monthly, with no additional worker contribution.

The Bridgeport Gas Company agreed to company-paid pensions of $40 monthly (exclusive of Social Security benefits) for employees 65 years old with 25 years of service. Employees also get three week vacations after 20 years of employment.

The 1100 employees of Eastern Gas & Fuel Associates, Everett, Mass., received an improved pension plan and additional health and welfare benefits.

Five hundred employees of Public Service Electric & Gas Co., Harrison and Newark, N. J., obtained a 4½ to 8½ cent increase in wages.

Construction, maintenance and service employees of the Duke Power Company were granted an average increase of 8½% for hourly and salaried employees, with office employee increases of from $10 to $25 per month.

Dayton Power & Light Co. employees received 3½ cents per hour increase, three weeks vacation after 20 years employment and minimum pensions increased to $100 a month for pensioners 65 years old with 30 years of service.

The Philadelphia Gas Works granted a 12 cent an hour increase to 2700 of its employees. Approximately 2½ cents was given for adjusted intraplant inequities, ½ cent for adjusted night shift differential and 8 cents Sunday differential.

The National Foremen's Institute reports that the new agreement at Consolidated Edison Company of New York cuts in half the time it will take a worker to go from the minimum to the maximum rate. Under former contract, workers received $2 weekly increases per year until top of rate range for the job was reached. Now they will receive boosts totalling $4 annually.

BY JAMES H. MCGOURTY
Labor Relations Analyst

Meetings were held with key civic officials to explain various phases of the changeover.

Strong Civic Appreciation Marks Laclede Conversion

by H. A. Eddins

Vice-president, The Laclede Gas Light Co., St. Louis

THE conversion to straight natural gas is a challenge to the planning and managerial ability of any gas company. The extent to which it is carried out successfully depends on the degree to which work is planned in advance and the efficiency with which the work is executed.

The conversion of The Laclede Gas Light Company's system from 800 Btu mixed gas to 1000 Btu natural gas began in St. Louis County May 16, 1949, and by December 6 the entire city and county areas served by the company were completed. It is believed that this is record time for a complete changeover for a company of this size. The changeover required the adjustment and conversion of 750,000 appliances of the company's 310,000 customers.

The company first announced that it would change to straight natural gas in 1946. Since the pipe line company supplying Laclede was unable to secure steel for pipe until 1949, this allowed sufficient time to give careful study to the tremendous task. While the planning, engineering and districting was handled by the company's own staff, the actual changeover work in the field was handled by Conversions and Surveys, Inc., whose supervisors, specialists and adjusters were able to complete the job in the record time of seven months.

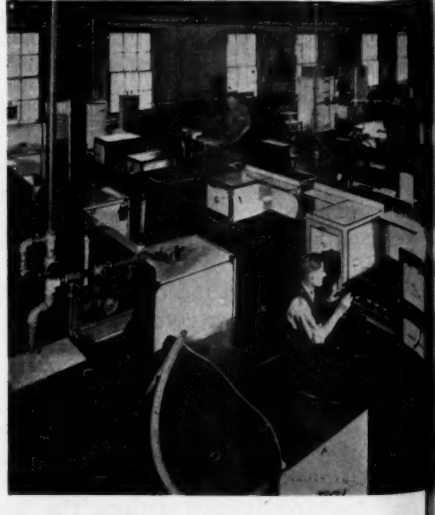
The City of St. Louis is served by a low pressure distribution system with medium pressure transmission mains, while the environs in St. Louis County are served by a high pressure system. This area, while outside of the corporate limits of the city of St. Louis, is contiguous thereto.

While the conversion work was continuous, starting in the city immediately following the completion of the county, different methods of conversion were used in the two areas. The county system was already valved and was sectionalized into small districts. Natural gas could be turned into a conversion district and customers' appliances converted to this gas.

The city system required the installation of valves to sectionalize it for conversion. An intermediate gas was distributed throughout the whole city system and appliances were converted to the intermediate gas by districts and natural gas introduced after completion of a district.

The intermediate gas which was distributed in the city was selected after laboratory tests of several mixtures on representative appliances. The gas selected was one that had nearly the same combustion characteristics as the old mixed gas, so that the customer could not be unduly inconvenienced while the district was being converted. The company increased the pressure in the city system from an average of 5½ inches water column to 6½ inches water column at the time the change to natural gas was being made. The intermediate gas used produced a minimum of over-gassing before burners were converted and a minimum of under-gassing after the burners were adjusted, and before the introduction of natural gas. This gas was a mixture of coke oven gas, air and natural gas; 880 Btu, 0.595 specific gravity, 6½ inches water column pressure.

At the start of conversion the low pressure system in the city had few existing valves except in transmission



The laboratory which was established for the testing of all types of gas appliances.

mains. To sectionalize this area 270 valves were installed, varying in size from three inches to 24 inches. The city was divided into 11 districts, the smallest containing 14,000 and the largest 29,000 meters with scheduled completion from seven to 14 days. The procedure for sectionalizing the city area was different from the county since an intermediate gas was being supplied the whole city. The district was isolated, the pressure was raised to 6½ inches water column average, and the adjustment of the burners was made on the intermediate gas. Natural gas was then turned into the district. Purging of mains was not necessary, because in using an intermediate gas purging was accomplished by customers' load.

The St. Louis County area was divided into 30 districts, the smallest containing 1,000 and the largest 4,500 meters, which gave a schedule of one to five days for completion of the district. On the day work was to start, the district was isolated, the feeder mains purged and the natural gas turned in. The burners were then adjusted on the new gas. The breakfast load purged the smaller customers' mains, but it was necessary to purge the larger feeder mains. The purging of the feeder mains was accomplished by blowing the gas to the atmosphere for a precalculated time.

Many months before work started a laboratory was established to test all types of appliances and burners and to determine mechanical procedure for conversion. One of Conversions and Surveys' utilization engineers and one of the company's chemists developed the conversion manual as a result of these tests. This manual detailed for the adjuster the method to be used in converting ranges, water heaters, space heating burners, special appliances and accessories of many types. This laboratory was kept in operation after the conversion work started to test burners both in the laboratory and in the field.

All of the available mediums were used to notify the community and the customer that a conversion to natural gas was to be made and appliances were to be converted to the new gas. Emphasis was placed on careful use of appliances by the customer before the adjuster arrived and before natural gas reached his home. Districting maps and schedules appeared in all the daily newspapers before the work started, direct mail pamphlets and letters were sent to notify and instruct the customers when conversion work was being done in their district.

Assistance and cooperation of the officials of the City of St. Louis and of the municipalities and towns in St. Louis County was sought to make the changeover easier for the consumer and the men doing the work. A luncheon meeting was held with the mayors and councilmen of the municipalities to explain the magnitude of the job, the methods to be used in making the changeover, and to demonstrate the work to be done on the customers' premises. The demonstration was made by showing, on top burners and oven burners, the change of the flames when natural gas was turned in on the old adjustment. Conversions and Surveys' adjusters then converted the burners and the proper flame was demonstrated. Similar meetings and demonstrations were held for officers of women's clubs and key personnel of the company. These demonstrations aroused the interest of the press who published informative articles and photographs in the newspapers on several occasions. In order to cooperate with the municipalities, personal calls were made on mayors, police and fire chiefs to notify them when conversion men would be in their area.

The customer contact departments play an important part in any conversion operation. To perform their work intelligently they must be informed of every phase of the operation. Training meetings were held with the telephone clerks and personal contact employees, explaining the whole program and their part of it. Procedure manuals were prepared so that customers' inquiries and complaints were intelligently handled, and inconvenience to the customer, the company, and the contractor was minimized. Telephone clerks were kept informed of the daily progress of the work and preparation of districts to be converted in the immediate future.

Laclede entered the conversion operation with the slogan "A good job, a safe job, and an economical job." All of these goals were attained in the completed job. A measure of the quality of the job is the customer reaction, the number of complaints from him, and the number of call-backs. The percentage of complaints and call-backs was small compared to the total number of meters converted.

ST. LOUIS newspapers were extremely cooperative throughout the entire conversion period, and Laclede made every effort to give them full details on all conversion problems. This publicity, in connection with letters to customers, folders, and newspaper advertising was of great assistance in securing the cooperation of the more than 300,000 customers in the area served.

Following are excerpts from editorials in two of the local papers:

"Three improvements in its service to the public are being made by the Laclede Gas Light Co. in its conversion to straight natural gas, which it will start in St. Louis county next month.

It is supplying a hotter-burning gas—one with 1000 British thermal units to the cubic foot, compared with the 800 Btus of the present mixture of artificial and natural gas. It is effecting savings and passing them on to its customers in the county and St. Louis to the tune of $1,060,000 a year. And as Mayor Darst says, it is strengthening "the city's fight against the smoke evil" by increasing the availability of this smokeless fuel.

"When the conversion has been completed throughout county and city—a task which the utility estimates will take a year or longer—300,000 customers will benefit."

"There are those in St. Louis—and unfortunately some are in positions of influence—who seem to view the city with the deepest of pessimism. Caught in a heavy web of timidity, they discount. . . .

"Fortunately, though, the timidity and pessimism are not shared by the city's utilities. Both Union Electric Co. of Missouri and Laclede Gas Light Co. have given renewed, cold-cash assurance of that fact within the past few days.

"Laclede has asked the Missouri Public Service Commission for permission to start the switch to straight natural gas in this area on May 16. Once the authority is given, Laclede will be launched on a five-year, $15,000,000 program to bring such gas to the area.

"Neither Union Electric nor Laclede, of course, looks upon its expansion as any philanthropic gesture. Both display, though, their willingness, on business calculation, to ignore again the voices of the over-cautious and the fearful. Only that willingness expressed before has let St. Louis reach its solid present. It is all to the good to know that the farsightedness and the faith persist to insure a really progressive future."

TYPICAL AVERAGE GAS ANALYSES

Mixed gas was served before conversion.
Intermediate gas was served during conversion of the city area.

	Mixed Gas 800 Btu	Intermediate Gas 880 Btu	Natural Gas 1000 Btu
CO_2	0.7	0.5	0.5
Ill.	1.0	0.4	0.0
O_2	1.9	1.1	0.0
CO	0.8	0.4	0.0
CH_4	70.1	80.5	91.0
C_2H_6	2.8	2.9	5.0
H_2	11.1	6.0	0.0
N_2	11.6	8.2	3.5
	100.0	100.0	100.0

Legal Decisions Indicate Circumstances For Cutting Off Service

By Leo T. Parker

Attorney at Law, Cincinnati

WHEN and under what circumstances may a gas corporation or municipality without liability cut off gas to consumers.

First, before reviewing higher court decisions illustrating legal pitfalls gas company officials should avoid when cutting off gas supply to consumers, it is well to explain that under *no* circumstances or conditions may a gas company avoid resultant damages for shutting off gas without giving the affected consumer an adequate and reasonable notification. Also, either a gas company or a municipality invariably will be held liable for breach of an expressed or implied contract to furnish gas. This is so although the company notifies the consumer that his gas supply will be cut off. In other words, a gas company cannot avoid responsibility or liability for breaching a valid contract to supply gas by notifying the consumer that his gas supply will be cut off.

For instance, in Coy v. Indianapolis Gas Co., 146 Ind. 655, a gas company was held liable in heavy damages for wilful failure to supply necessary gas in severe winter weather to a dwelling. The testimony showed that the company breached its contract with the dwelling owner to supply gas.

The Supreme Court held that since breach of the gas company *to* discharge its duty to dwelling owner directly contributed to sickness and death of his child, the company was liable. This court explained that it was the general duty of the public utility to supply gas to the consumer, and there was no proof of any failure of the dwelling owner to comply with the terms of his contract with the gas company.

Contributory Negligence

Another important point of law is: A gas consumer cannot recover damages for his illness or injury resulting from his own negligence. This rule of law is applicable where the alleged illness or injury resulted from failure of the gas company to turn on gas, or its act of turning off gas.

For comparison, see Fort Smith Gas Co. v. Cloud, 8 Cir. 75 F. 2nd 413. Here the testimony showed that a man named Cloud rented a house and a gas company agreed to supply natural gas to the house for heating and cooking. Believing that the gas would be immediately turned on, Cloud moved his family into the house, but the gas was not turned on until about 4 o'clock in the afternoon. The testimony showed that the gas company's employe had promised to turn on the gas at 11 A. M. Soon after 11 o'clock Cloud's wife and children went to a neighboring house where they were warm and comfortable. However, Cloud remained in the unheated house, which was very cold, until the heat was turned on. Several hours after the company's employe turned on the gas Cloud took a severe chill. He became very ill.

In subsequent litigation the lower court held the gas company liable, but the higher court reversed the decision holding the gas company not liable. The higher court said:

"Even if it could be said there was unreasonable delay in installing this meter, such delay was not the proximate cause of plaintiff's (Cloud's) injuries, and to constitute actionable negligence the injury must have been the natural and probable consequence of the alleged negligent act. The consequence of the negligent act must be within the range of probability as viewed by the ordinary man, and consequences which are merely possible cannot be regarded as either probable or natural. One is bound to anticipate only the reasonable and natural consequences of his conduct. Defedant could not reasonably have anticipated that plaintiff, a man of mature years, would remain exposed, idle, and inactive in this unheated house in zero weather for some seven hours."

The higher court explained further that the proximate cause of Cloud's sickness was not the gas company's delay in installing the meter, and turning on gas, but failure of Cloud to exercise reasonable care to protect himself against exposure. Under these circumstances Cloud was contributory negligent, which barred recovery of damages.

Modern higher courts consistently hold that a gas company is not liable for an unknown person's negligence.

For instance, in Wright v. Southern Gas Co., 283 Pac. 824, it was disclosed that before a tenant moved out of a building, he ordered the gas company to turn off the gas. In turning off the gas, the company's employe, as is customary, turned off the stopcock controlling the flow of gas into the meter, and then sealed and locked it. The seal was not very substantial and a new tenant, after renting the building, found the seal broken. Subsequently an explosion occurred, resulting from escaped gas, seriously injuring the new tenant who sued the gas company for damages.

The higher court held the gas company not liable, saying:

"Some one tampered with the lock and seal and turned the stopcock, so that the gas would again flow through the meter."

Therefore, it is quite apparent that a gas company may avoid liability for injuries or illness caused by escaping gas, or resulting from gas being turned off if the testimony indicates that its employes did not perform the act which caused the damage.

Must Prove Case

All higher courts agree that before a court will hold a gas company liable in damages for shutting off gas to a private residence, the property owner must prove that his gas supply was cut off *before* he received a notification from the company that the gas would be cut off.

For example, Koontz v. Public Service Co. of Northern Illinois, 66 N. E. (2d) 490, reported 1947, the testimony showed facts, as follows: A gas consumer named Koontz failed to pay his bill for gas furnished to his dwelling. He became a bankrupt and so notified the gas company. Nevertheless, the gas company's official refused to continue furnishing gas to Koontz and receive payment on the small percentage basis of settlement usually afforded a bankrupt. Koontz refused to deposit a relative cash deposit with the company to guarantee

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Much Is Favorable on Financial Front for Gas Industry

by Harold H. Young

Partner, Eastman, Dillon & Co., New York

IT has been difficult to match the record of growth shown by the natural gas companies. Growth is one of the main selling points which we in the investment field have in presenting utility securities. We tend to find a certain degree of apathy as to situations which are static rather than vigorous. In the war and postwar years you had problems revolving around the phenomenon of rising costs. In many instances you had difficulty in getting prompt relief through higher rates or else you found it impractical to seek rates fully compensatory for higher costs because of the necessity of maintaining competitive position and avoiding undue consumer resistance.

Attention of the investing community was stimulated by steps taken by some of your companies to develop new manufacturing processes which have reduced costs. The use of a high Btu gas has been especially fascinating as it has permitted substantial increases in business without corresponding increases in plant investment. News that natural gas will come to New England has, however, touched off real interest in the securities of the gas companies in this area. Because of the remoteness of the supply of natural gas, New England is one of the last sections of the country which will receive this service. Accordingly, we have had an opportunity to see elsewhere what the transition from manufactured gas to natural gas means on the bottom line of a profit and loss statement—the spot in which investors are most interested. Many of you have been struggling with the problem of inadequate return on your investment. Now there are prospects of relief in this direction.

Natural gas transmission and distributing companies elsewhere have made some very fine showings. I can testify that the investing public likes the securities of companies distributing natural gas and that a ready demand exists for them.

Pipe line financing has been extremely successful. There has been so much demand for shares of these companies that prices now appear to discount earnings for a considerable time ahead in many instances.

A particularly tough river crossing on the Texas to New York pipe line of Transcontinental. (Photo courtesy Jones and Laughlin Steel Corp.)

Projects such as these cost money—and today investor money is cautious, seeking the most advantageous opportunity. That the position of the gas industry is sound is the view of the author of this article.

What I am telling you about the revived interest in your securities is not news, I am sure, but probably it is music to your ears as it has been a long time since some of your companies, at least, have been the center of so much attraction and interest. This situation is probably pleasing to you from another angle, also, since many of you will have to come into the market to raise money for financing conversions and expansions and you are glad to know that you will come to a receptive market.

Speaking now of public utility securities, in general, and not limiting matters to gas companies, I can give you full assurance that the market is in a healthy state. This applies both to senior securities and equity issues. There are willing buyers for all types so long as a company can meet the ordinary requirements as to weight and fineness of its offerings.

The demands for bonds seem almost insatiable. This is due, in part, to the trends of savings habits. Individuals find it increasingly difficult to set aside any substantial sums over and above their living expenses and taxes but they are carrying large amounts of life insurance. Retirement income plans are popular. As you well know, many corporations are setting up pension funds for their employees. Consequently, insurance companies and the banks which act as trustees for pension funds have huge sums of money to invest. Large amounts of bonds are purchased and, of course, public utility bonds are popular in this connection. Preliminary figures for the life insurance companies of the country indicate that admitted assets last year showed a net increase of more than $3,800,000,000. Public utility bond holdings increased by around $1,000,000,000. As long as you have such a volume of life insurance funds seeking an outlet along with other institutional

Presented at annual business conference, New England Gas Ass'n, Boston, Mass., March 1950.

PROMOTION PROGRAMS GO FOR GLAMOR

Above—The press agent says these Brooklyn Union beauties wore hats "symbolizing the advantages of the gas flame" at the recent Spring Style Show meetings held to acquaint cooperating dealers with the 1950 appliance sales campaign of the utility. Whatever they symbolize, we have placed an order for half a dozen—assorted.

Below—Portland (Ore.) Gas & Coke company's contribution to the better way of life for its plumbing and heating dealers was a feature of the Hawaiian water heater contest meeting. The winners draw an expense-paid Hawaiian vacation for two. "Size 'em Up" was intended to refer to the water heaters.

demands, there is little to worry about the ability to dispose of bonds.

Interest rates have declined in the recent past. They are still above the lows of 1946 but have been trending toward that level. Some utility companies have been using debentures, especially with the idea of keeping bondable additions for possible future needs, but their use has not been widespread. The preferred stock market, which was in the doldrums for some time, has shown some revival in recent months. A surge of demand for preferreds culminated around 1946 with the sale of some issues to yield less than 3½ per cent. The biggest demand came in a period when the mortgage supply for institutions was very low. With a subsequent change in general money rates, preferred stock yields rose to 4 or 4½ per cent and institutions saw stocks purchased at 100 selling at 80 to 85. This chilled their enthusiasm for preferred stocks and gave rise to demand for sinking funds or purchase funds on preferred issues. These were generally unpopular with utility companies and many were reluctant to provide such funds for their preferred stocks. More recently, the demand for these funds seems to have gone by the board and preferred stocks can now be sold without them. The demand for preferred has been revived somewhat by the low return on bonds and the urge of institutions to enhance the average yields of their portfolios. I might note in passing that in recent years the best outlet for preferred stocks has been the institutions where historically it was with the individuals. Private investors have been driven out of the market in large measure by the low returns.

Some use has been made by utility companies of convertible securities. They serve a useful purpose when a company foresees a definite set of circumstances arising in the future, such as a favorable change in dividend policy, which will make the common stock sell higher than it is selling at the time of the financing. The danger in convertible securities lies in their use where there is no foreseeable change in the status of the common stock but where there is dependence, rather, on a general improvement in the equity market to make conversion attractive.

Two years ago three objections to utility stocks were frequently recurring. People feared the flood of new common stocks coming out of holding company break-ups; they worried about the amount of money to be raised for new construction and they were apprehensive about the utility companies being caught in a squeeze between inflexible rates and rising prices. These fears proved ungrounded. The new stocks coming on to the market both from holding companies and from new financing were readily absorbed. The upward trend of costs finally leveled off and rates proved not to be inflexible.

At the moment, the relative weight of the forces of supply and demand seems to favor higher prices. As to supply, we note that the end of the break-ups of the large holding companies is in sight. As to the construction programs, it looks as if the peak for the utility industry, as a whole, might have been hit last year. Certainly, there should be no problems any more serious than those successfully coped with a year ago. On the demand side we find that institutions are coming back into the market for large blocks of utility common stocks and that the floating supply is being very well cleaned up. Already there have been marked rises in prices and diminution in yields but I feel this merely has been a correction of a situation that should not have existed in the first place.

As recently as 1946 high-grade utility common sold to yield about 4.20 per cent and medium grade common about 4.65 per cent. I do not say that we are necessarily going to see as low yields as this again, but I do feel that the yields are going lower than they are at present, assuming, of course, no change in the general market situation. I make this qualification because although I am thoroughly sold on utility stocks and spend my days trying to sell them to other people, I nevertheless recognize that no group of stocks can be insulated against the averages of a general declining market.

With the present good demand for utility stocks and sound reasons for expecting it to continue, the road should

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Meter Performance Compared under Plan Of Extended Periodic Change

by Gordon G. Dye

Southern California Gas Co., Los Angeles

EXTENDED periodic meter change programs offer an especially good opportunity to gas companies to reduce operating and maintenance expenses. Under relatively good gas conditions this proposition is particularly attractive because it can be accomplished without materially sacrificing meter performance or adversely affecting service to customers. The trend at present is definitely toward a longer periodic change schedule. Some states have already adopted a 10 year, or possibly longer, program instead of some shorter period. The attitude of state regulatory bodies will be favorable to cost reduction, provided the standards of meter accuracy are sustained. Consequently there is little likelihood that any state regulatory commission will not approve an extended periodic change program provided it can be established by the companies concerned that meter performance under an extended program will not suffer appreciably.

It must be borne in mind, of course, that each time a meter comes to the shop the proof is brought back near the nil point. Consequently, the average performance of those meters which become quite fast or quite slow would be better under a shorter change period. Those meters which come in with a proof within the legal limits of accuracy may have a better average performance under a longer change schedule. It appears possible to obtain better over-all meter performance under a ten year program, for example, than under a seven year program, if gas conditions are relatively good and relatively stable.

Insofar as service to customers is concerned, the less frequent shutting off gas to change meters could be considered an improvement of customer service.

The statement that meter performance may be better under a longer change program may sound somewhat anomalous. It can be established, however, that on the average, new or repaired meters experience a comparatively rapid proof change during the first few months of the "in-service period" and then operate for longer periods of time with very little change in proof. Therefore, removing meters from service for repairing, especially if diaphragms are disturbed, may result in an over-all poorer performance record than would result if the meters were simply left alone.

Some time or other, of course, meters will require repairing or replacing, and one important problem facing us now is determining how long meters will go without repairing. Some of our meters which have not had diaphragms oiled for 20 years are going back to service for a probable ten years additional operation. (The company is now on a ten year basis temporarily and application has been made to the Public Utilities Commission for a permanent ten year program.)

Many diaphragms, however, require reoiling or replacing at an earlier date. Development of testing and screening procedures which make it practical to select, without opening, those meters which should have diaphragms reoiled and which may be passed for another period of service, is an important function of the meter repair department.

At present we rely upon our knowledge of the characteristics of the particular type of meter involved, the performance history of that type of meter, statistically interpreted, and the use of differential gauges on the meter provers. Our methods do not give perfect results and frequently we open meters which could have operated through another change period without reoiling.

Possibly, too, a few meters get back to service which should have been reoiled. It is doubtful if any method will give perfect results, and averages must be relied upon and practical, economical limits developed. Even if all meters were opened (to assume the extreme) careful inspection of the diaphragms could not give perfect results. The *change in the oil content of a diaphragm,* under "good" gas conditions, is very gradual and no one can say from an inspection just when it is economical to reoil in borderline cases or when the diaphragms should be left as they are and the proof undisturbed.

Consequently, a simple workable screening procedure should be developed which will give good over-all results at reasonable cost. We are now re-evaluating our performance data by use of up-to-date statistical methods, but do not know yet whether this work will lead to better and simpler techniques of evaluation or not.

The satisfactory performance over relatively long periods of time which can be expected from diaphragms without reoiling, emphasizes the importance of putting the meter in first class condition when it is opened. Proper repairing of top mechanism, with replacement of parts which show appreciable wear, should be worthwhile. Wear of moving metal parts, rather than diaphragms, is likely to be the limiting factor, and in the endeavor to increase the in-service period of meters, this must not be overlooked.

It Can Be Done

The facts that diaphragms will serve 15 or 20 years without need of reoiling and that other parts will, in general, operate many years are not enough. Meters must perform satisfactorily with respect to proof. The object, of course, is to construct and repair meters in such a manner and set the out proof at a point which will result in a large percentage of the meters performing within the legal limits of accuracy (and as near the nil point as possible) for a long period. It is not the purpose here to enter into a discussion of the techniques of analysis and repair whereby this objective may be accomplished, but rather to show that satisfactory performance under an extended periodic change program can be attained.

In 1939, Henry Harris published an article entitled "A Method of Prognosticating Meter Errors" in the *Proceed-*

Presented at meeting of Operating Section, American Gas Ass'n, Detroit, April 3-5.

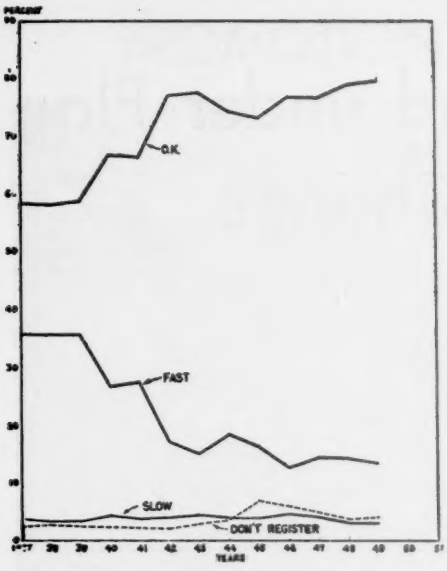


Fig. 1—Performance of meters, by years 1937-1949

ings of the American Gas Association. This article deals with the problem of analyzing meter performance and relating it to specific conditions, including out proof. This is the method, presumably, that he used in analyzing the results of a repair program developed by himself and adopted by the former Los Angeles Gas and Electric Corp. about 1934. This repair policy was carried over into the Southern California Gas Co. at the time of the merger in 1937, and is still followed in the combined company. After making allowance for time required to establish the new procedures in the old Southern California Gas Co. portion of the combined company, it probably would be reasonable to assume that since 1939 all meters have been repaired under this plan.

Fig. 1 shows the trend in meter proofs since 1937 and gives an idea of the improvement which has been accomplished. Many factors have contributed to this improvement. One of the most important from the point of view of repair procedures is that of not disturbing diaphragms until it is necessary. Under the repair procedure there are four general classifications of repairs. These are:

AA: Prove and paint.
A: Clean and grind valves. Check and adjust top work. Prove and paint.
B: Reoil diaphragms, plus work mentioned under A.
C: Replace diaphragms, plus work mentioned under A.

Obviously, the A and AA type of repairs are less expensive than the B and C and if diaphragms will perform satisfactorily for long periods, at least the difference in cost between the less expensive repair and more expensive repair can be saved. Then if metal parts will last and satisfactory proofs can be maintained the periodic change time can be extended feasibly.

Another factor which has contributed to the improved performance indicated by the graph is improved gas conditions. In 1927 the practice of serving straight natural gas was started. Only relatively small quantities of oil gas have been used since that time. Prior to 1927 reformed natural gas mixed with straight natural was used, supplemented by small quantities of oil gas at times of natural gas shortage. Consequently, prior to 1927 the gas was saturated at the prevailing temperature. During the first two or three years following 1927 efforts were made by one of the companies to keep the gas saturated by steam injection but this was given up as being harmful rather than helpful. In addition, water sealed holders had an effect, and some gas obtained from nearby fields at relatively low pressures contained some moisture. The surface of water in the holders was sealed with oil about 1932. At present the effects of the water sealed holders and the local gas are comparatively small.

It can be stated, further, that the average age of the meters tested becomes greater in recent years. The company was operating under a seven year change program prior to the War Production Board order in 1942 extending all test periods to 10 years.

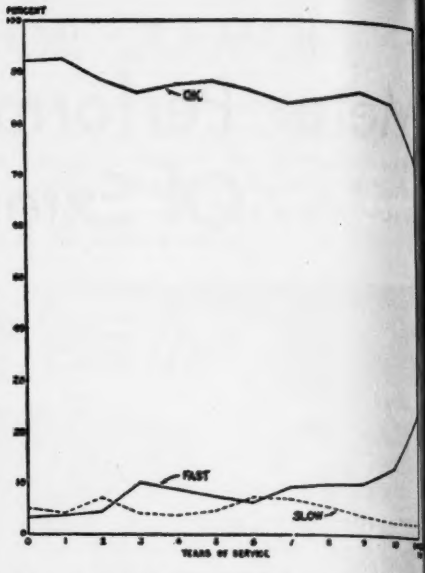


Fig. 2—Performance of meters tested in 1949 by years of service

Fig. 2 shows the performance of meters tested in 1949 by years of service. In order that a better comparison of slow, accurate and fast meters could be made, DR meters were eliminated in this case. The figures on which Fig. 1 is based include DR meters. Therefore, the percentages shown on Fig. 1 do not exactly correspond to those shown on Fig. 2. The percentages in either case

(Continued on page 62)

Michigan's Growth Helps Gas Sales

GROSS revenues in gas sales for my company last year were $17,930,000. Domestic sales represent 42 per cent of this gas business, space heating 35 per cent and commercial and industrial 33 per cent.

We are taking on many new space heating customers. Last year, with the authority of the Michigan Public Service Commission, we took on 12,000 added space heating customers. Early this year all restrictions were removed and at the close of last week we had added 9,732 space heating customers. This brings our total space heating customers up to 62,596. At the time we applied to the Commission to lift restrictions, we told the Commission we expected to add 15,000 space heating customers this year.

We are revising these estimates now and believe a more realistic figure is in the neighborhood of 30,000. The average space heating customers under our present rates will have an annual bill of about $140.

In March we had an all time record in the sale of over three billion cu. ft. of natural gas.

The increase in number of gas customers served is greater percentagewise than the electric customer growth. Gas customers have grown from 209,700 in 1940 to 289,788 last year, or an increase of 38 per cent.

This growth in both branches of the business is due in large measure to the increased population in the territory in which we operate. Michigan gained more people since 1940 than any other state with the exception of California, in the gross amount of 1,100,000.

In the development of our Michigan gas storage for the past three years, and through this present year, . . . we had little cushion in 1947 and we dipped into it in 1948 and 1949. Last year we put some gas in storage and this year we have gained. We will have over 65 billion cu. ft. in storage at the year end. At no time over these years has any customer been forced to curtail or suspend operations due to lack of adequate gas supply.

By Justin R. Whiting, President of Consumers Power Co., before the New York Society of Security Analysts, April 1950.

CHRONOLOGY *of the* NATURAL GAS INDUSTRY

COMPILED BY LUIS HILT
E. Holley Poe & Associates; Former Librarian, American Gas Association

The earliest history of natural gas, a mystical phenomenon to the ancient world, has been well recorded many times and in many places. The Chronology of Natural Gas, here presented, is a record of historical highlights in the development of the industry in our own country. Compiled from basic sources of information, the Chronology includes a table of statistical data germane to the story, regarding natural gas reserves, production and consumption.

1775

THE GENESIS of the natural gas era of the United States was a "burning spring" on the banks of the Kanawha River, nine miles above the present city of Charleston, West Va. General George Washington, impressed by the phenomenon, described it in this manner: "The tract of which 123 acres is a moiety was taken by General Andrew Lewis and myself for, and on account of, a bituminous spring which it contains, of so inflammable a nature as to burst forth as freely as spirits, and is nearly as difficult to extinguish."

This "Burning Spring" was in the heart of what became the first great natural gas producing region—the Appalachian Area.

1821

THE PRESENCE of natural gas as a burning spring was discovered in Fredonia, N. Y., and prompted the first useful consumption of natural gas in the United States. In this year, a seepage of gas on the banks of Canadaway Creek was accidentally ignited and people of the village, thinking it too good a fuel to waste, drilled a well 27 feet deep, piping the gas through small "pump logs" to several nearby houses for lighting. This was the first natural gas well dug for that specific purpose in America.

1825

ON A VISIT to the United States, General Lafayette arrived by stage coach at the old Taylor House in Fredonia at 2 A.M. June 4, to find the place brilliantly illuminated in his honor by natural gas.

1838

OHIO's first reported use of natural gas occurred on a farm near Findlay. The gas, encountered in digging a water well, was conveyed through wooden pipe to the farmhouse and lighted off the end of a gun barrel.

1840

NATURAL GAS was initially used in Pennsylvania for the evaporation of brine in the refining of salt by John Criswell, at Centerville, Butler county. This is the first recorded use of natural gas as a fuel for manufacturing.

1841

NOT FAR from George Washington's "burning spring" in the Kanawha Valley of West Virginia, William Thompkins struck a large flow of natural gas while boring a salt well. He piped the gas to his salt works and used it instead of coal to boil down brine.

1859

THIS EVENTFUL YEAR, marked by the birth of the modern oil industry, saw the creation of the present AMERICAN GAS JOURNAL. Making its first appearance on July 1, as THE AMERICAN GAS LIGHT JOURNAL, it was the first publication to serve the gas industry and record its progress. By the time Colonel Drake brought in the world's first drilled oil well, near Titusville, Pa., the new magazine was two months old.

1860

THE FIRST oil lease to mention gas was recorded in Warren county, Pa. Dated April 7, from B. W. Lacy to the Warren Oil Co., the lease conveying a "corner of the farm" contained this clause: "should no oil be found in profitable quantities, but other minerals or gas be found in such quantity as to justify production thereof, they are to have the corner designated for one-fourth of the gas or other mineral."

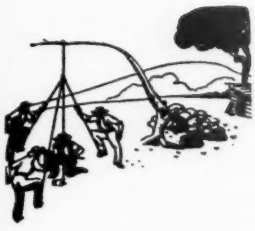
Natural gas development in Kansas started with the drilling of several wells in Miami county near the town of Paola.

1865

THE FIRST COMPANY to engage in the natural gas business was formed in Fredonia, N. Y., as the Fredonia Gas Light and Water Works Co.

Natural gas, from a well near McCoy's Station, Pa., was first used for manufacturing lampblack.

1872



THE FIRST iron pipe line was constructed to bring waste gas from nearby oil wells to Titusville, Pa. The line consisted of two-inch pipe and was 5½ miles long. It was completed on August 1 and delivered 4,000,000 cu. ft. of gas a day to 250 domestic and industrial customers.

The American Gas Light Association, first national gas association to be formed in this country, was created at a meeting held in Cleveland in September of this year.

1874

THE FIRM of Rogers & Burchfield at Leechburg, Pa., became first to make iron and steel with natural gas, by using it as boiler fuel and for puddling and heating furnaces.

1880

THE FIRST natural gas compressing station was put into operation by the Bradford Gas Co. at Rixford, Pa. The plant had a compressing capacity of 5,000,000 cu. ft. a day and a discharge pressure of 60 pounds.

1883

THE CHARTIER VALLEY GAS CO. was formed by manufacturers to bring natural gas to their glass and steel plants in Pittsburgh; gas was piped in from Murrysville in Westmoreland county, Pa.

1884

GEORGE WESTINGHOUSE, having found gas on his property in Pittsburgh, organized the Philadelphia Co. The use of natural gas in Pittsburgh increased so greatly that, according to a statement by Andrew Carnegie, one natural gas company alone had 335 miles of pipe within the city and was supplying 250,000,000 cu. ft. daily. He claimed that natural gas had supplanted 10,000 tons of coal a day.

1885

THE FIRST suggestion of ordorizing natural gas to assist in leak detection was made by Irving Butterworth, of Columbus, at a meeting of the Ohio Gas Light Association.

The first carbon black factory using the channel process was built by Peter Neff at Gambier, Ohio.

1891

THE FIRST high pressure, long distance pipe line was constructed by the Indiana Natural Gas & Oil Co. Two parallel eight inch lines of wrought iron pipe with screwed couplings were laid a distance of 120 miles from gas fields near Greenstown, Ind., to Chicago. A notable feature was the 525 psi maximum working pressure, unusual for that period.

1892

ALTHOUGH OIL had been discovered in Colorado 30 years previous, the production and use of natural gas only began this year, when the Florence Oil & Refining Co. supplied several homes in Florence with the gas output of one of its wells.

1900

AT THE TURN of the century, natural gas had been discovered in 17 states and production was valued at $23,698,694. Pennsylvania was the leading gas producing state.

1901

ARKANSAS' first natural gas deposit of commercial importance was discovered near Mansfield in Sebastian county.

On January 10 the famous Spindletop field near Beaumont, Texas, was discovered by Captain Anthony F. Lucas. The discovery well was the first to be drilled with rotary tools; it opened up the rich Gulf Coast Area, and was the first field discovered on a salt dome.

1903

SYSTEMATIC gas repressuring as a method for secondary recovery of oil began in certain oil fields of Ohio.

Although not the first for California, nine gas wells were drilled in the Ventura field some 50 miles northwest of Los Angeles and natural gas was piped to Ventura.

1904

NEAR the historic Drake well at Titusville, Pa., the first plant for extracting natural gasoline from natural gas by the compression and cooling method was built by Andrew Fasenmeyer.

THE FIRST important natural gas transportation company in the Midcontinent Area was formed by a number of gas producers who consolidated to organize the Kansas Natural Gas Co. Two 16 inch pipe lines were constructed from gas fields in Allen, Neosho and Wilson counties to Kansas City, and from the Montgomery county field to Joplin, Mo.

1905

FROM the gas fields of eastern Kansas, midcontinent development began to move to the southwest when a wildcatter discovered the famous Glenn Pool of Oklahoma. While essentially an oil field, it also proved consequential to natural gas.

Caddo field in northwestern Louisiana was discovered and marked the beginning of natural gas production for that state.

In this year there were 2,139 natural gas producing companies operating in the US.

1906

ON FEBRUARY 20, a group of 21 natural gas men met in Kansas City to organize the Natural Gas Association of America.

The Louisiana State Legislature passed an Act making it a criminal offense to allow a gas well to remain out of control, or to burn or blow into the air wastefully the natural gas from any well, and authorizing the taking over of a neglected wild well by the state board of engineers at the order of the Governor.

For the first time in the rapidly expanding natural gas industry statistical information on volume and value of production and consumption was gathered. The results were published by the U S Geological Survey in "Mineral Resources of the United States, 1906."

1907

CADY AND MCFARLAND discovered natural gas to be a source of helium. This rare element was found in the production near Dexter, Kansas.

The state of Texas, later to become the greatest natural gas reserve holder and producer of interstate supplies, began to import natural gas by the first pipe line to cross its border, from the Caddo field in Louisiana to the city of Texarkana.

The Santa Maria Gas Co. of California became the first utility company in the state to provide natural gas domestic service.

1909

THE HOGSHOOTER gas field was discovered in northern Oklahoma and a company was formed to build a 16 inch pipe line to Joplin, Mo.

Natural gas was delivered to Cincinnati for the first time through a 183 mile, 20 inch pipe line from fields in West Virginia.

Among the natural gas producing states, West Virginia gained first place in production, a position it held for 14 years.

1910

THE US Bureau of Mines was organized and, through its efforts, engineering knowledge regarding natural gas and oil began to be widely disseminated.

Oklahoma's Hogshooter field became the source of supply for several newly constructed pipe lines, and the state, fearing an untimely depletion of its resources tried without success to adopt legal measures to prevent the exportation of natural gas.

Early in the year, Fort Worth and Dallas, Texas, received natural gas for the first time through the newly constructed pipe line of Lone Star Gas Co. extending 100 miles from the Petrolia field in Clay county.

The first liquefied petroleum gas was produced at the Sistersville, West Va., refinery of the Riverside Oil Co. A. N. Kerr, then general superintendent of the company, pioneered the development of this new industry.

1911

WELDING of pipe joints by oxy-acetylene was introduced by the gas industry, the first practical application being made on an 11 mile line of the Philadelphia & Suburban Gas Co.

The orifice meter, as evolved from the Pitot tube and designed by H. C. Cooper and J. G. Pew, was first used to measure large volumes of natural gas on an installation in West Va.

1912

THE WEYMOUTH formula for computing the flow of natural gas through pipe lines was introduced by Thomas R. Weymouth in a paper before the American Society of Mechanical Engineers.

1913

NATURAL GAS was discovered in Montana, in Dawson county.

A 120 mile, 12 ¾ inch pipe line was completed from Buena Vista Hills, Kern county, Calif., over the Tehachapi Mountains to Los Angeles. On April 28, the first natural gas was delivered to Los Angeles where it was mixed with manufactured gas.

The Oklahoma State Legislature passed a law providing for ratable production from the common reservoir of natural gas. This act, it is believed, was the first oil or gas field conservation measure of this type to be enacted by any state.

The oil absorption method for natural gasoline recovery was initiated by John G. Pew, of Hope Natural Gas Co., Hastings, West Va.

1915

THE IMPORTANCE of geology and engineering in the scientific production of oil and gas began to receive widespread recognition when California created a Department of Petroleum and Gas within the State Mining Bureau.

1916

UNDERGROUND storage of natural gas in depleted or near-depleted pools was first practiced in the Zoar field, Concord, N. Y. The stored gas was piped 30 miles north to Buffalo.

In the search for oil, the rich Monroe gas field was discovered in Louisiana. The proved area has since been estimated to cover approximately 260,000 acres and lies in the parishes of Morehouse, Ouachita and Union in the northern part of the state.

NATURAL GAS RESERVES, PRODUCTION C

All Quantities in Billions of Cubic Fe he E

Year	Natural Gas Reserves (Trillion Cu. Ft.) [a]	% of Natural Gas Reserves Consumed	CONSUMPTION: Domestic	Commercial [b]	Total Domestic & Commercial	Field Use	Refineries	Carbon Black	Cement Plants	Power Plants [c]	Othe Industr
1906			110		110						
1907			132		132						
1908			141		141						
1909			151		151						
1910			170		170						
1911			175		175						
1912			193		193						
1913			185		185						
1914			203		203						
1915			217		217						
1916			235		235						
1917			258		258						
1918			271		271						
1919	15.0	4.97	256		256	170		50		21	24
1920	15.	5.32	286		286	202		40		25	24
1921	15.	4.41	248		248	182		51		24	15
1922	15.	5.09	255		255	198		54		27	22
1923	15.	6.71	277		277	343		109		31	24
1924	15.	7.61	285		285	393		157		48	25
1925	15.	7.93	272		272	424	88	140		46	21
1926	23.0	5.71	289		289	478	122	131		53	24
1927	23.	6.28	296		296	549	123	144	24	63	24
1928	23.	6.82	321		321	574	115	175	31	77	21
1929	23.	8.34	360		360	705	104	261	41	113	31
1930	23.	8.45	296	81	377	723	99	267	41	120	3
1931	46.0	3.67	294	87	381	571	76	196	31	138	2
1932	46.	3.38	299	87	386	529	68	168	21	107	2
1933	46.	3.38	283	86	369	491	66	190	22	103	3
1934	46.	3.85	288	91	379	555	80	230	27	128	3
1935	62.0	3.09	314	100	414	580	80	242	27	125	4
1936	62.	3.50	343	112	455	619	93	283	37	156	5
1937	62.	3.88	372	117	489	651	113	341	41	171	5
1938	66.0	3.48	368	114	482	659	110	325	37	170	5
1939	70.0	3.54	392	118	510	681	98	347	40	191	6
1940	70.	3.80	444	135	579	712	128	369	42	183	6
1941	85.0	3.31	442	145	587	686	148	365	54	205	7
1942	113.8	2.68	498	184	682	721	202	336	64	240	8
1943	110.0	3.10	529	205	734	781	244	315	52	306	9
1944	110.	3.37	562	221	783	855	315	356	35	360	9
1945	140.9	2.78	607	230	837	917	339	432	38	327	10
1946	147.8	2.73	661	242	903	898	331	478	58	307	10
1947	160.6	2.85	802	285	1087	934	364	485	60	373	11
1948	165.9	3.10	896	323	1219	1022	441	481	72	478	11
1949	173.9[g]	3.22	980[h]	370[h]	1350[h]	n.a.	n.a.	n.a.	n.a.	550	
1950	180.4[g]										

Source of Data: U. S. Bureau of ons,

a. Geological estimates as of the beginning of the year stated.
b. Included with domestic consumption until 1930.
c. Source: Federal Power Commission.
d. U. S. consumption. Excludes exports to Canada and Mexico.
e. For the years prior to 1947, the Bureau of Mines reported gas usefully consumed in the U. S., plus exports

CONSUMPTION IN THE UNITED STATES

Exception of Estimated Reserves

Power Plants c	Other Industrial	Total Industrial	Total Consumption d	Marketed Production e	Repressuring	Net to Underground Storage	Losses & Waste	Total Production	Net Production f	Utility Sales g	Year
		279	389	389							1906
		275	407								1907
		261	402								1908
		330	481								1909
		339	509								1910
		338	513								1911
		369	562								1912
		397	582								1913
		389	592								1914
		412	629								1915
		518	753								1916
		537	795								1917
		450	721								1918
21	249	490	746								1919
25	245	512	798								1920
24	157	414	662								1921
27	229	508	763								1922
31	247	730	1007	1007							1923
48	258	856	1141	1142							1924
46	218	916	1188	1189							1925
53	240	1024	1313	1313							1926
63	246	1149	1445	1445							1927
77	275	1247	1568	1568							1928
113	333	1557	1917	1918							1929
120	315	1565	1942	1943							1930
138	291	1303	1684	1686							1931
107	275	1168	1554	1556						775	1932
103	312	1184	1553	1555						792	1933
128	366	1386	1765	1771						933	1934
125	442	1496	1910	1917	90	11	480	2498	2397	1010	1935
156	518	1706	2161	2168	73	11	393	2645	2561	1200	1936
171	597	1914	2403	2408	85	14	433	2940	2841	1284	1937
170	511	1812	2294	2296	101	15	649	3061	2945	1185	1938
191	607	1964	2474	2477	171	8	677	3333	3154	1298	1939
183	642	2076	2655	2660	363	15	656	3694	3316	1406	1940
205	760	2218	2805	2813	644	16	630	4103	3443	1570	1941
240	800	2363	3045	3053	753	21	627	4454	3680	1729	1942
306	971	2669	3403	3415	825	19	902	5161	4317	1959	1943
360	992	2913	3696	3711	883	10	1010	5614	4721	2114	1944
327	1010	3063	3900	3919	1062	25	896	5902	4815	2156	1945
307	1038	3110	4013	4031	1038	19	1102	6190	5133	2195	1946
373	1123	3339	4426	4582	1083	10	1068	6733	5650	2515	1947
478	1232	3726	4945	5148	1221	51g	810	7179	5958	2895	1948
550	n.a.	4050h	5400h	5600h	n.a.	83g	645g	n.a.	6245g	3075	1949
											1950

...ons, except where otherwise noted.

as marketed production. On the new basis, line losses and stored gas are included.

f. Net production equals marketed production plus losses and waste, insofar as field waste is reported.

g. Source: American Gas Association.

h. American Gas Journal estimate, subject to revision.

n.a. Not available.

1918

COMMERCIAL production of helium was started at Fort Worth under the direction of George A. Burrell and Richard B. Moore.

At a meeting in New York City in June the American Gas Association was organized through consolidation of the American Gas Institute and the National Commercial Gas Association.

In the northern part of Potter county, north Texas, natural gas was discovered in what later became the renowned Panhandle oil and gas field, the world's largest gas producing reserve, which is composed of almost 1,600,000 acres.

1919

POSSIBLY the earliest of reliable estimates of US natural gas reserves was made by geologist E. W. Shaw who estimated them at 15 trillion cu. ft.

The first plant for recovering natural gasoline by the charcoal absorption process was built at Lewis Run, Pa., on the property of the United Natural Gas Co.

The Hugoton gas field was initially drilled in southwestern Kansas. The first deep well started this year was completed as a gas well three years later at 2755 feet. Hugoton is the world's largest dry gas field and is estimated to enclose 3,850,000 acres in Kansas, Texas and Oklahoma.

1922

THE FAMOUS Smackover field in Arkansas was discovered by a wildcatter.

New Mexico became an oil and gas producing state with completion of its first well, a gasser. The 2428 foot well opened up the Ute Dome gas field in San Juan county.

A program of cooperation was initiated between the US Bureau of Mines and the natural gas industry through its official body, the Natural Gas Association of America. A manual defining efficient utilization and conservation was prepared by the bureau and distributed by the association to natural gas consumers.

1923

IN COOPERATION with the Natural Gas Association, the US Bureau of Mines started the first of a series of scientific studies relating to natural gas. It dealt with leakage losses from high pressure pipe lines and was published five years later.

Geophysical exploratory methods were first adopted by the oil and gas industry in the Gulf Coast of Texas.

Oklahoma displaced West Virginia as the leading state in natural gas production.

The natural gas industry passed the one trillion mark in the quantity of gas produced and marketed.

1924

THE Natural Gas Association of America directed its technical and research committee to undertake a study of gas measurement by orifice meters. Much of this work was done in cooperation with the American Society of Mechanical Engineers and the US Bureau of Standards.

The first long distance, all-welded natural gas pipe line was completed by the Magnolia Gas Co. of Dallas. The line consisted of 14, 16 and 18 inch telescoped pipe, acetylene welded, and ran 214 miles from the Webster parish field in Louisiana to Beaumont, Texas.

1925

THE AGA Testing Laboratory was established at Cleveland. It was founded to promote and insure safe and satisfactory gas service to consumers, through research, formulation of standards, and testing of appliances.

Seamless pipe was developed and became available to the natural gas industry. An important advance in technology, it paved the way toward construction of large diameter pipe lines capable of carrying higher pressures. The use of this pipe with welded joints also effected a reduction of internal friction.

1926

THE ERA of long distance natural gas pipe lines began with construction by Interstate Natural Gas Co. of a 170 mile, 22 inch line from the Monroe field to Baton Rouge, Louisiana. Work was started in May and completed in December and represented a pioneering effort in the construction of large gas lines through low, swampy terrain. The $13,000,000 project was designed to deliver 100,000,000 cu. ft. of gas daily, operating at a maximum working pressure of 350 psi.

Pressure maintenance, or the recycling of natural gas in flush production of oil, was first practiced this year in certain California, Kansas and Texas oil fields as an important conservation measure.

1927

THE FIRST natural gas field in Michigan was discovered two miles from Muskegon and that city became the first in the state to use the fuel.

A further advance in pipe manufacturing methods was the introduction by A. O. Smith Corp. of high strength, electrically welded line pipe. Mass production of large diameter steel pipe with less wall thickness was now practical.

The Buttonwillow dry gas field was discovered in Kern county, Calif.

On August 1 the Natural Gas Association of America was merged with the American Gas Association.

Under direction of a mixed gas research committee, the AGA Testing Laboratory began work on an investigation to determine practical limits of variations in heating value, pressure, specific gravity and chemical composition of fuel gases. The results, summarized in Laboratory reports, included an interchangeability formula.

1928

TEXAS became top producer of natural gas, taking the lead from Oklahoma.

In October, the Kettleman Hills gas and oil field of California was discovered, creating a tremendous increase in the amount of natural gas available for central California communities.

In June, Denver and Pueblo, Colo., changed to straight natural gas supplied by the longest and largest natural gas pipe line in existence at that time. The gas was transported through approximately 200 miles of the Canadian River Gas Co. line from Amarillo in the Panhandle field to Clayton Junction, New Mexico, where it connected with the Colorado Interstate Gas Company's 254 mile line of 20 inch and 22 inch pipe.

The installation of tubing in flowing wells against high pressures had its inception in the gas fields of northern Louisiana.

Construction of the 100-mile, 18-inch extension of the Monroe field-Baton Rouge pipe line was completed to New Orleans, bringing that city its first natural gas.

Electric welding of pipe joints in the field was first used.

1929

ON JANUARY 1 the city of Memphis received its first natural gas service. Supplied from Monroe field, it was introduced through the Memphis Natural Gas Company's 210 mile, 18 inch pipe line, completed at the end of 1928 at a cost of $6,000,000.

On August 16, natural gas was first delivered to San Francisco, Oakland and San Jose from the Buttonwillow and Kettleman Hills fields. The 297 mile pipe line, built by Pacific Gas & Electric Co. of 16, 20 and 22 inch pipe, was the first large diameter, long distance gas line of all-welded construction.

1930

THE Rodessa field was discovered as a gas field but subsequent development proved it to be a major oil and gas field, lying in three states—Louisiana, Texas and Arkansas.

1931

NATURAL GAS was introduced in Washington, D. C., when the Washington Gas Light Co. changed to a mixed gas of 600 Btu.

Natural gas came to Chicago in October when The Peoples Gas Light & Coke Co. started distributing 800 Btu mixed gas. The Natural Gas Pipe Line Co. of America piped the gas through a 24 inch welded steel line, 1000 miles long, from the Texas Panhandle.

Construction was completed on Panhandle Eastern Pipe Line Company's line from the Hugoton-Panhandle field, starting at Dumas, Texas, to Rockville, Ind. An intermediate line to Muncie, Ind., connected it with the Columbia system and through this connection, Texas gas was made available for distribution to eastern markets for the first time. The pipe line consisted of 20, 22 and 24 inch pipe, and, approximately 900 miles in length, was constructed at an average unit cost of $31,280 per mile. Five years later, the line was extended to a total length of 1,200 miles by a branch to Detroit.

In a period of depression, it was recorded this year that the natural gas industry afforded some stabilizing influence through its pipe line expansion activities. About 7,700 miles of transmission lines were constructed at a cost of $318,265,000, utilizing approximately 75 per cent of the total steel pipe tonnage produced in the US.

1934

NATURAL GAS was first used in Minneapolis. Conversion to 800 Btu mixed gas was completed by June 1, 1935.

1935

EXPERIMENTAL CYCLING operations were first put into effect in the Big Lake field of Texas, where condensate wells, thought to be freak gasoline wells, had been producing large quantities of liquid hydrocarbons for several years.

The American standard code for pressure piping was first issued, sponsored by the American Society of Mechanical Engineers and approved by the American Standards Association.

On February 16, the Interstate Oil Compact Commission was formed with six charter states—Texas, Oklahoma, Illinois, Kansas, New Mexico, Colorado—for the purpose of conserving oil and natural gas by the prevention of physical waste. Congress approved the compact on August 27.

1936

DETROIT changeover to straight natural gas was completed following extension of Panhandle Eastern Pipe Line Company's system from Zionsville, Ind.

A discovery gas well opened up the great Carthage field in Panola county, eastern Texas.

1938

THE FIRST commercial gas cycling plant began operation in the Agua Dulce field in Texas. It initiated a highly important conservation measure.

On June 14 Congress passed the Natural Gas Act which became operative on June 21. It marked the entrance of the federal government into the field of regulatory control of the natural gas industry.

1942

ON FEBRUARY 7, the amended and broadened Section 7 (c) of the Natural Gas Act became effective. This Section together with Section 7

(e) provides for the issuance of certificates of public convenience and necessity for the extension, acquisition, construction or operation of natural gas pipe lines.

Construction of the "Big Inch," the War Emergency 24 inch crude oil pipe line, started on August 3, and the first oil arrived at Philadelphia on August 21 of the following year. The 1,340 mile pipe line, which cost the Federal government $78.5 million, was laid from Longview, Texas, to deliver crude oil to the eastern seaboard at a time when enemy submarines were sinking tankers.

1943

CONSTRUCTION of the "Little Big Inch," the War Emergency 20 inch oil products pipe line, started on April 23 and the first gasoline arrived in Linden, N. J., on March 2 of the following year. The line originated at Beaumont, Texas, and terminated at the New York area, a total length of 1,475 miles. Cost was $67.3 million.

1944

BY ITS ORDER of September 22, the Federal Power Commission initiated the Natural Gas Investigation in Docket No. G–580 to consider problems relating to the production, transportation and utilization of natural gas "and such related matters as may be helpful in the administration of the Natural Gas Act or in determining what additional legislation, if any, should be recommended." The hearings began on September 18 of the following year and were concluded on August 2, 1946. The hearing record totaled 14,434 pages of transcript and 477 exhibits.

On October 31, the Tennessee Gas & Transmission Co. began delivery of natural gas through its 1265 mile pipe line from fields in Nueces county, Texas to its terminus, Hope Natural Gas Company's Cornwell station in West Virginia. It was the longest pipe line of its kind up to this time and was built at a cost of $54,000,000., as an essential part of the war program to augment gas supply in the industrial Appalachian area.

1947

THE NATION's capital joined the ranks of straight natural gas users in October when the Washington Gas Light Co. completed its conversion from mixed gas service.

On November 13, El Paso Natural Gas Co. began supplying California with its first Texas gas upon completion of the 30 inch, 213 mile section from Blythe to Santa Fe Springs, where the pipe line connected with the Southern California Gas Co. and Southern Counties Gas Co. systems. The entire line, 1,000 miles of which were completed this year, will consist of 1,200 miles of 30, 26 and 24 inch pipe reaching to the Hugoton-Panhandle field. The initial delivery capacity was 175,000,000 cu. ft. daily and 305,000,000 per day ultimately, at which time the maximum discharge pressure at Blythe will be 810 psi. Total cost of the project is estimated at $70 million.

On November 14 Texas Eastern Transmission Corp. acquired title to the "Big Inch" and "Little Big Inch" pipe lines. Earlier in the year, the company had submitted a bid of $143,127,000 to the War Assets Administration for the purchase and operation of the lines as natural gas carriers. Consummation of the sale made it the largest single cash transaction in the history of the gas industry.

This year saw the first application of the electrically driven centrifugal compressor to the propulsion of large volumes of natural gas at high pressures, when Texas Eastern Transmission Corp. began operating three such stations on its Big and Little Inch pipe lines.

1949

IN MAY, Transcontinental Gas Pipe Line Corp. began construction of its $235,000,000 pipe line from Hidalgo county, Texas, to New York City. The 1840 mile line of 26 inch and 30 inch pipe was designed for an initial capacity of 340 million cu. ft. a day, to supply utilities in the Philadelphia-New Jersey-New York areas.

On August 22 the first natural gas to be delivered to New York City arrived at Staten Island, placing the New York & Richmond Gas Co. first among northeastern seaboard utilities to convert from manufactured to straight natural gas. Gas was taken from the terminus of the Big and Little Inch pipe lines by the Staten Island company.

The first gas well in Maryland to yield production in commercial quantities came in on September 12. It was drilled in with cable tools by the Cumberland & Allegheny Gas Co., and by late October acidization had increased its open flow to 432,000 cu. ft. per 24 hours. The 4,500 foot well is located near Oakland.

During this year the FPC authorized construction of a total of 7,571 miles of pipe line and installation of compressor units aggregating 499,800 horsepower, total estimated cost of these facilities being $615,249,000. From February 7, 1942, when certification procedure first became effective, to the close of the year more than 30,100 miles of pipe line and 1,904,000 horsepower in compressor units had been approved and the entire cost of these projects was estimated to be $1,824,099,000.

1950

THE Federal Power Commission won two victories in its campaign to extend jurisdiction to cover natural gas production and distribution. In the East Ohio case, the Supreme Court ruled that a natural gas distributor, operating solely within a state, but selling gas that moves interstate, is subject to FPC control. The Kerr Bill, designed to specifically exempt independent gas producers from FPC control, was vetoed by President Truman as not being in the national interest.

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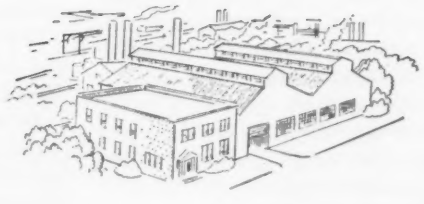

OKLAHOMA NATURAL
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General Office TULSA, OKLAHOMA

Improved Pressure Control Methods Step Up System Capacities

By Kenneth R. D. Wolfe
Fisher Governor Co., Marshalltown, Iowa

MANY problems face the gas distribution departments of utilities now getting natural gas for the first time. Probably the most important problem is "how to get enough gas through the old pipe system to handle the tremendous increase in load."

Naturally, each utility has its own individual conditions, and there is no uniform way to solve the problems for all properties. There are, however, tried and proved ways to increase gas capacity through an old system, keep the "unaccounted for" within reason, and be economical from a cost standpoint.

Pressure boosting in gas mains to handle peak loads is, of course, not a new idea. Hundreds of pumps, blowers or rotary boosters have been used for this service throughout the history of the industry. The type of booster referred to here, however, is of the automatic pressure regulator type, which is a self-contained unit that can be installed in a conventional regulator pit or house and requires no outside motive force, such as steam or electricity.

This type of booster regulator is not new, as the equipment to be discussed in this article was perfected more than ten years ago in the mid-continent natural gas area, where there are many hundreds of these controls giving excellent service and saving the industry thousands of dollars each year.

The problem every gas distribution man must solve, with the advent of natural gas into his property, is the most logical and economical method of increasing his gas send-out.

There are two basic ways to accomplish this—lay new and larger mains, or increase the distribution pressure. The first method, in many of the older properties, is desirable, but extremely costly and usually prohibitive except in isolated cases. The second method may be more economical from a capital investment standpoint, but it may prove costly from an operating standpoint, due to greater increased "unaccounted for" unless careful consideration is given to the best possible methods for increasing pressures. Automatic pressure regulators having pressure boosting features have proved very adaptable in this application. Among the boosters available are the Fisher-King gas pressure booster, designed for controlling and reducing pounds to pounds, and the Fisher time-temperature booster regulator for reducing from pounds to ounces.

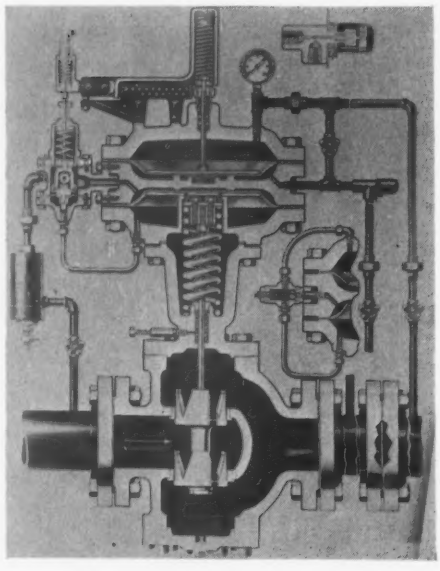

Fig. 1—The Fisher-King booster.

It is the purpose of the Fisher-King gas pressure boosting regulator to increase automatically the discharge or reduced pressure in accordance with the load demand in the distribution system, thus tending to maintain a constant reduced pressure at the low point in the distribution system.

To do this, an orifice plate is installed in the pipe line on the downstream side of the regulator. In conjunction with the orifice, there is an upstream orifice tap and a downstream orifice tap. As gas passes through the orifice plate, it creates a pressure differential which is registered in the two orifice taps.

In this pressure boosting device the upstream orifice tap is connected to the bottom side of the pressure boosting diaphragm. The downstream orifice tap leads to the upper side of the booster diaphragm. Thus, as the demand in the downstream system increases, creating a greater differential across the orifice, the booster diaphragm moves upward. This upward movement compresses the booster differential spring and the force created is transmitted through the lever giving a new and greater pressure setting to the pilot loading regulator. The pilot loading regulator creates a greater pressure on the upper side of the main diaphragm, opening the main valve to meet the increased demand and, at the same time, supply this demand at a boosted pressure.

Fig. 1 shows the Fisher-King booster, and Fig. 2 shows a schematic line drawing of a proposed installation. This type of booster is commonly referred to as a velocity type gas pressure booster. The term "velocity type booster" comes about due to the fact that a change in velocity across an orifice plate and, therefore, the differential pressure across the orifice plate, is utilized to create the boosting action of the regulator.

Velocity type gas pressure boosters are automatic pressure regulators, but have the added feature and ability automatically to increase or boost the downstream pressure in relation to increased demand and flow of gas in the low pressure system. Thus, a velocity type booster can and does automatically increase or decrease the outlet pressure at the regulator to compensate for the pressure loss in the distribution piping, to maintain a constant pressure at the end of the system, or at a selected distant point from the regulator in the system.

This discussion will be confined, principally, to intermediate or high pressure loop lines where the pressures generally run from one lb pressure on up to much higher values. The Fisher-King booster is not intended for low pressures in ounces or as a district regulator, but is limited principally to reducing from pounds to pounds, such as town border station regulators, where the pressure is put into the intermediate system and later reduced either through

district regulators or house service regulators.

Constant pressure regulators which maintain a given or set pressure at the outlet have been used for many years for this service, but they have always had their limitations and objections, mainly because you actually do not want to maintain a constant pressure at the regulator on this kind of a system, but rather, it is best to maintain a constant pressure at the lowest pressure point in the system, regardless of the load.

The last phrase, "regardless of the load," is the catch to why constant pressure regulators fail to perform the ideal type of service on this kind of an installation. No doubt the reader is familiar with many systems where it is necessary to keep adjusting the constant pressure regulators by changing the regulator setting, by putting weights on or taking weights off the regulator lever, in order to compensate for fluctuations in the gas demand. This method, of course, is objectionable because: First, it is costly in manpower; second, it is never possible exactly to anticipate, by manual adjustment, what the gas load is going to be; third, manual adjustment tends to overpressure the system, thus unnecessarily increasing the unaccounted for gas loss.

Special studies, extending over several years, were made of this problem, and as a result, the two pressure booster controls that exactly compensate for fluctuations in the gas load and permit just the correct amount of pressure on the distribution system to maintain a constant pressure at the so-called "low pressure point" in the system at all times, have been developed. In actual practice, where these boosters have been installed, the average distribution pressure has been lowered from 30 to 60 per cent, and likewise, the unaccounted for gas has been reduced a similar percentage.

In considering the King booster, it is best first to discuss briefly the application of this type of booster, its primary requirements and where it does the best type of control work. The conditions of gas distribution systems vary a great deal, although they do all follow a common pattern. However, each system has its individual characteristics, and consequently there are many conditions of a variable nature which must be handled by a booster of this kind. Its high degree of flexibility in adjustment makes it ideal for these conditions. It is realized that in some systems a distribution pressure of five lbs would be required, whereas in others 10 lbs or possibly 50 lbs or even higher may be necessary to perform the desired pressure function of the system. With this type of control it is possible to get any delivered pressure from one lb on up to as high as 300 lbs delivered into the downstream system. Therefore, the regulator is ideally suited for town border stations or for feeding intermediate loop lines within a city distribution system, or for supplying gas in a long line connecting one community with the other.

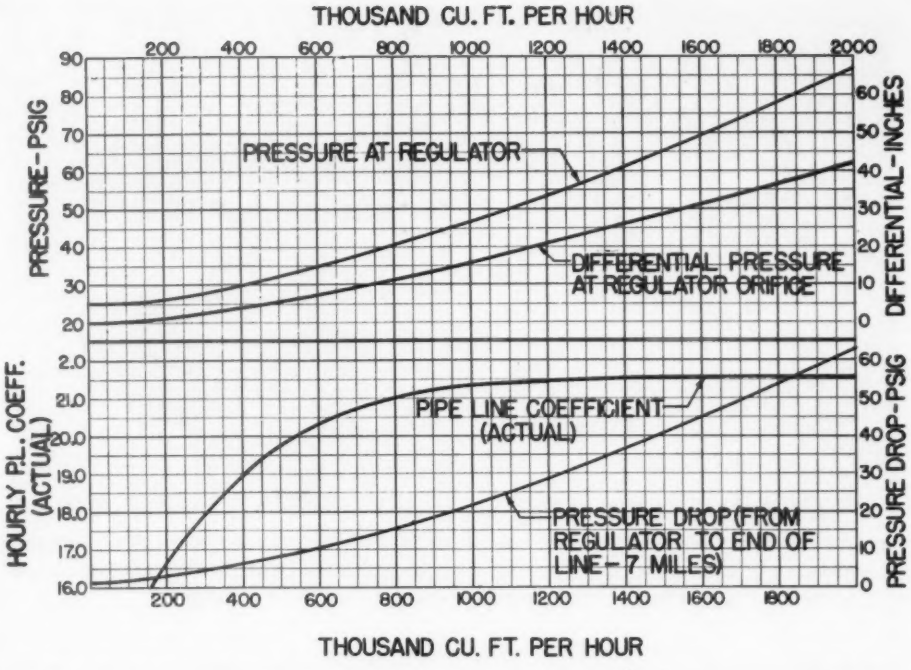
THOUSAND CU. FT. PER HOUR
200 400 600 800 1000 1200 1400 1600 1800 2000
PRESSURE - PSIG
90 80 70 60 50 40 30 20
DIFFERENTIAL - INCHES
60 50 40 30 20 10 0
PRESSURE AT REGULATOR
DIFFERENTIAL PRESSURE AT REGULATOR ORIFICE
HOURLY P.L. COEFF. (ACTUAL)
2.0 2.1 2.0 1.9 1.8 1.7 1.6
PRESSURE DROP - PSIG
60 50 40 30 20 10 0
PIPE LINE COEFFICIENT (ACTUAL)
PRESSURE DROP (FROM REGULATOR TO END OF LINE - 7 MILES)
200 400 600 800 1000 1200 1400 1600 1800
THOUSAND CU. FT. PER HOUR

Fig. 3—Curves show how booster maintains pressure at low pressure point.

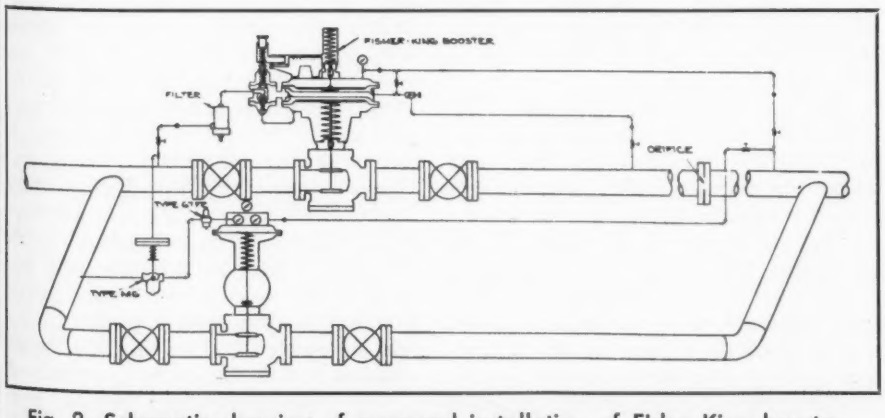

Fig. 2—Schematic drawing of proposed installation of Fisher-King booster.

It is a well-known fact in the gas industry that the lower the distribution pressure is in a pipe line, the lower will be the "unaccounted for gas." While there are a great many theories as to the ratio of gas leakage to pressure in buried pipe lines, it has been the author's experience that there is nearly a direct ratio between these two factors. Thus, if you have a distribution pressure of 10 lbs and can lower that distribution pressure, say, to five lbs, you will lower the "unaccounted for" gas approximately 50 per cent. The prime purpose of a booster regulator of this type is to give your customer better gas service by maintaining a better average distribution pressure and to effect an average savings on your distribution losses. There are, of course, many additional advantages, such as elimination of many man hours, truck hours and mileage that have formerly been devoted to the attention of manually adjusted regulators of the constant pressure type.

In a gas distribution system having eight or ten miles of pipe line installed beyond the regulator, the King booster actually maintains a constant pressure at the low pressure point in the system and, therefore, compensates for the frictional pressure drop in the pipe line between the regulator and the low pressure point.

Fig. 3 shows exactly what this booster regulator does in service. These curves were plotted from an actual installation and show exactly how the booster maintains the pressure at the low pressure point in the downstream system. This booster was feeding into a 16" line, seven miles in length, the low pressure point being near the end of the line,

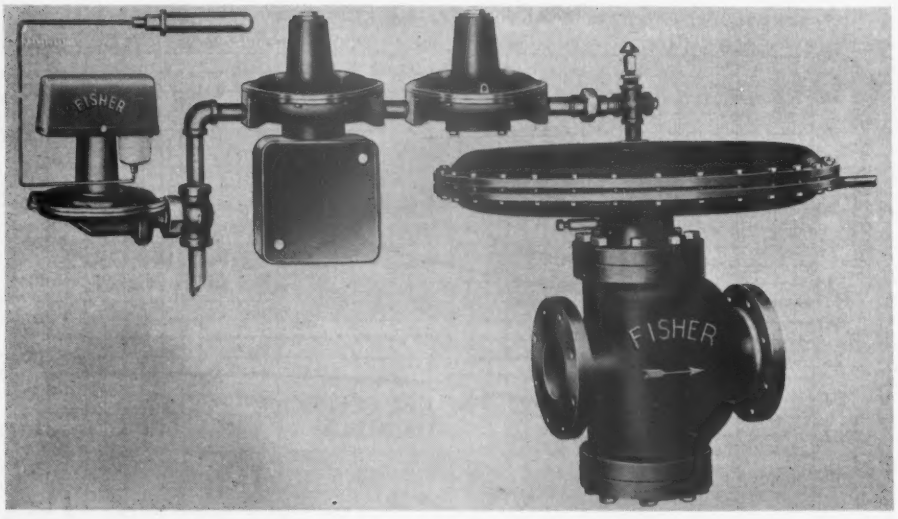

Fig. 4—The time temperature gas pressure booster is designed to control reduced pressures in gas distribution systems and to adjust automatically that pressure in accordance with atmospheric temperature changes.

where gas was delivered to a power plant. It was desired to maintain 25 lbs pressure at the power plant, regardless of the load on the line. The upper curve shows the reduced pressure at the regulator. The lower curve shows the pressure drop from the regulator to the end of the seven mile line. It will be noticed that these two curves are exactly parallel. The pressure at the regulator on 0 flow was 25 lbs, which was the desired setting at the regulator, and also, the desired pressure at the low pressure point in the system seven miles away. At a flow of 1,000,000 cu. ft. per hour, the pressure at the outlet of the regulator was 47 lbs, and the pressure drop in the line for the same identical flow was 22 lbs, leaving 25 lbs pressure at the end of the line. At a flow of 2,000,000 cu. ft. per hour, the pressure at the outlet of the regulator was 88 lbs, the pressure drop in the seven miles of line was 63 lbs, leaving 25 lbs pressure at the end of the line, which was the desired delivery pressure. It will be noted that the actual pipe line coefficient has been plotted and deviates considerably from the theoretical coefficient.

The control as portrayed by these curves is typical of this type of booster regulator, and it matters little whether the pipe line is shorter or longer than the one described above. The main thing to remember is that the booster does compensate exactly for the pipe line friction, and thus makes it possible to maintain a constant pressure value at the selected low pressure point in the system.

Regulation from Pounds to Ounces With Time Temperature Boosters

The Fisher time-temperature gas pressure booster is designed as a district regulator for reducing from pounds to ounces or pounds to inches of water column. (Fig. 4.)

This regulator is designed especially for the low pressure system which has connected to it a high saturation of residential heating load. On such a system it is a well-known fact that the peak load conditions are naturally caused by the residential heat load demand. It is also a well-known fact that the relationship of the gas send-out to atmospheric temperature is in inverse ratio. In other words, as atmospheric temperature goes down, residential heating requirements

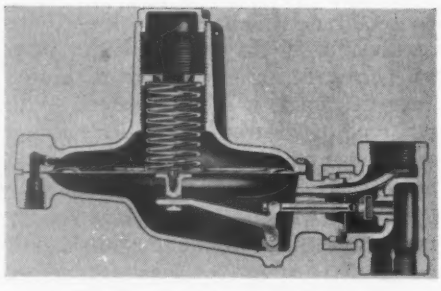

Fig. 5—Service regulator.

go up. Generally speaking, little or no residential heating is required as long as the atmospheric temperature is above 65 deg. F, but as the temperature falls below that point, residential heating requirements increase.

The time-temperature booster has been designed to compensate automatically for the residential heating load where undersized mains require that some pressure boosting be done on the low pressure system as the heating load increases. Thus, once this booster is properly set for the conditions on which it is to operate, no further manual attention is required. Consequently, it completely eliminates the necessity of manhandling the old type constant pressure district regulator, putting weights on the lever or taking weights off the lever, and changing the pressures many times a day, which always resulted in pressure jumps or drops in the line, tending to create dust problems, pilot light outages, etc.

The time-temperature booster regulator is so designed that it will boost the delivery pressure as little as 1″ wc when the atmospheric temperature falls 75 deg. F, or it can be adjusted to increase the delivery pressure any amount up to 27″ wc. Naturally, no low pressure system would require an increase greater than a few inches of water column, but the wide rangeability and flexibility of adjustment of the regulator permits adjustment for any operating condition.

There are many advantages to this type of a control. If there are several district regulators in a distribution system, each regulator can be set to boost the required amount to take care of the area which that regulator is theoretically supplying, and still all regulators throughout the system will boost their proportional amount in a uniform and coordinated manner, because the primary factor that is causing the boosting function is the change of atmospheric temperature, and in the average community this atmospheric temperature is uniform throughout the city. Therefore, it affects all regulators in a uniform manner. Thus, one regulator could be set to boost 1″ wc on a 30 deg. temperature drop, where another regulator might be set to boost 2″ wc on the same degree drop. The third regulator might be set for 1/2″ wc boost on a similar temperature drop.

These regulators boost in a perfect throttling manner. There is no step action, and, of course, the boosted pressure is reduced in a throttling manner as the atmospheric temperature is increased.

One big advantage of this type of control is that if a sudden drop in temperature occurs in a particular area, these regulators which are affected by atmospheric temperature immediately start to boost the distribution system up to the proper and predetermined pressure value. It may be one to three hours before the actual residential heating load comes on, due to the slow heat loss from the buildings, but in the meantime the regulators have properly pressurized the system, preparatory to accepting the additional heating load that will come onto it. Likewise, if the atmospheric temperature suddenly rises, these regulators automatically reduce the distribution system pressure, thus keeping the average distribution system pressure at the lowest possible value and consequently lowering the "unaccounted for" to the lowest possible level.

The time-temperature booster regu-

(Continued on page 58)

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Experiments Made in Installing Services On Production Line Basis

By James E. C. Currens
Pacific Gas and Electric Co.

Part 2 : Actual Field Test

AN ACTUAL field test, of course, calls for the selection and perfection of the equipment to be used, the principal equipment under question being boring and trenching outfits.

The regular crews, that is a standard five-man and light foreman organization, have developed, largely in the field and largely by themselves, a very practical and efficient type boring machine called the "sled type" borer. This consists principally of an air motor with the water channel and a tall handle terminating in a sled so that the machine may be pulled along the trench bottom by a ring as the bore progresses and the service itself is used as the boring string. This machine has done excellent work in many of our divisions. The only handicap is a very resistant soil; then the task of pulling the machine becomes arduous, and it is practically impossible to bore soils that have light shales or other rock. This machine was the starting point for these tests.

Looking at the general considerations as far as the gas man is concerned, soils are of three principal types.

1. Rocky or resistant, such as hardpan, light shales and very dry hard formations.
2. Soils which break down well when wetted so that the binder being broken down, large quantities of the cuttings may be flowed away easily.
3. Soils which do not break down well under water treatment and which tend to form a sticky, gummy mass and whose cuttings will not flow away easily.

We found that we had no equipment whatever for the hardpans and rocky soil, and that the ordinary bit was of no use whatever, as it required too much pressure to force it into the formation in order to form cuttings. A scarifier type of bit with three blades finished with tungsten was the answer.

For soil that breaks down easily, the ordinary fishtail bit is quite successful. However, a bit of the type illustrated with the boring machine has been developed as it centers itself better and tends to reduce the cuttings to finer sizes. This bit uses three spiral blades. Soils that break down well require some care as far as the feeding of the machine is concerned. Feed should be fast and the amount of water limited. Soils of this type can be bored at the rate of five or six feet a minute and make very successful boring.

The sticky soils are perhaps the hardest to handle. The bit advances through the soil, the cuttings are forced by the bit itself and form a gummy mass behind the bit, which soon builds up enough friction on the boring bar to throttle down even a motor five horsepower size.

The only suggestion in work on this type of soil is the use of large quantities of water and high pressure, cutting quite a large diameter hole for the size of pipe to be installed so that there will be passageway for the cuttings to flow away. The exercise of a great deal of care to assure that the bore is opened full length is useful. The more grade which can be put into the bore, the better. The minute the bore closes up behind the bit, you get into trouble because very soon the water pressure will build up against the obstruction behind the bit and force itself out through the pavement or under the pavement in which case there is no chance whatever to bring cuttings out to the entrance of the bore. Cleaning out the hole is the only remedy.

The next difficulty had to do again with very difficult bores, or bores which took more than the ordinary amount of time. The bore which was delayed in completion held up the whole crew, not only those which were concerned with the boring, but the rest of the men because their work would probably be completed and they would be waiting. This was one of the principal reasons for separating the boring crew and getting them ahead of the main crew.

In order not to require so many men for the bore and still be able to handle hard soil, we found it necessary to go to the winch. The machine, complete with the winch, is illustrated. This is a new machine and is the pilot model of a local manufacturer operating out of San Francisco. The machine is equipped with pulleys and sheaves so that for very hard boring it is possible to double or triple lines and so increase the pressure against the bit. The winch is controlled by the small disc clutch.

Lately many of our services are far outside of the city limits and in places the water pressure is very poor in the

Simple hand operated winch on sled type boring machine. Note cable.

der of 10, 15 or 20 pounds. We find at particularly in the sticky soils, it is impossible to operate with pressure under 45 pounds. It at once became necessary to furnish a booster operating from the customer's supply. This booster pump, which is illustrated, is driven directly off the main shaft of the boring machine. It is quite capable of furnishing plenty of water at 100 to 110 pounds. It is equipped with a relief valve so that the pipe will not be split or other damage done. We have found some split pipe since we have been using this pump. With these improvements, we believe the boring situation is pretty well under control and that a crew of two men can make nearly any bore.

Some of our divisions are experimenting with boring bars but we found that the standard modified acme thread as handled by a local concern in San Francisco is perhaps best.

With sled type or hand held boring machines, threads have to be sturdy and shoulders must meet up well or threads are broken continually. Where the boring string is the ¾" wrapped service itself, an adapter is made going from the ¾" pipe to the acme thread. Where a bore is to be made through stiff soils or rocky soils, where the wrapping may be damaged, we use acme threads on a bar about the weight of a 1" extra heavy pipe. This pipe string has plenty of flexibility and still is not too heavy to be handled easily by the men. We tried 1¼", but it is too heavy and worked too much of a hardship on the two men handling a long string.

Manufacturers should note the fact that at least for our projects for installation of ¾" service, that the machine should be balanced well enough and equipped with sufficient handles so that two men can handle it.

We expect the boring crew to watch the motor lubrication which is usually automatic, wash the machines down well after a bore and oil the threads and replace the protectors on all male threads.

Trenching

One of our first troubles in setting up the production line was a very simple and obvious difficulty. In our ambition to use as small a trench as possible, in order to cut down on back filling, particularly where it had to be hand dug, we got a trench which was a little too tight for the sled type boring machine which we were using. The action was very simple and immediate. The ditch banks grip the machine, any inequalities in the thread or the boring string tend to move the machine which resisted the motion because of the banks and nothing could happen except the breaking of the bars or threads. With opening up of the trench to the proper width, the difficulty disappeared.

Our western soils are rather severe on digger teeth, particularly the teeth which have not been treated. We are using the jeep largely on our trenching for services and we found that the eastern type of slicing cutter could not stand the rocky and abrasive soils and hardpan found on the coast. The answer to this problem has been forthcoming rather promptly from the manufacturers and we are now using a hard finish of tungsten pieces on the teeth. The teeth illustrated, with the exception of the Pent-a-bit, have each gone 8400 feet. The short one was faced with stellite only, the other with tungsten "pieces." We are expecting at least three times this life for the tungsten. Note: The two pronged bit is used on the boring machine.

We have found that many of our machines have been operated at too high speed on the digging chain and the cost of our crews and our operating has thereby been run up badly. Running about 250 rpm the machine works well and the life of the machine greatly increased.

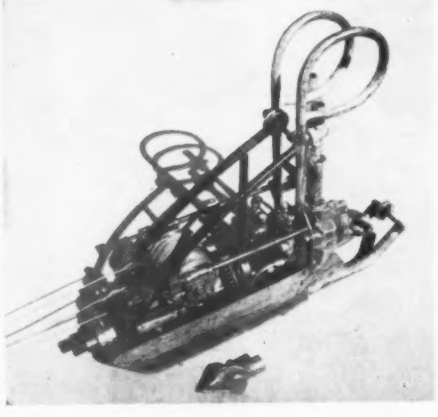
We feel that the original jeep requires some reinforcements. Several of our first trenchers were set up only after the frame was stripped and a complete job of reinforcing done. We believe now that a supplementary frame, available locally, is the answer, as it carries the jeep trenching attachment on one end and the split backfill blade on the other end, so that the jeep frame itself furnishes only power for trenching and mobility.

The newer models are coming out with heavy frames and many improvements including hydraulic drive. Just now we are very interested in a tractor built for industrial and agricultural use.

This machine, as illustrated, is four-wheel drive, built without springs, is very sturdy, has good road speed, and is not hard riding even though it is a tractor rather than an automobile as far as its mounting is concerned. It seems to have ample power and it has the unique advantage of the proper weight distribution.

There are situations in which no

Illustration above shows boring machine in position for drilling through the yard.



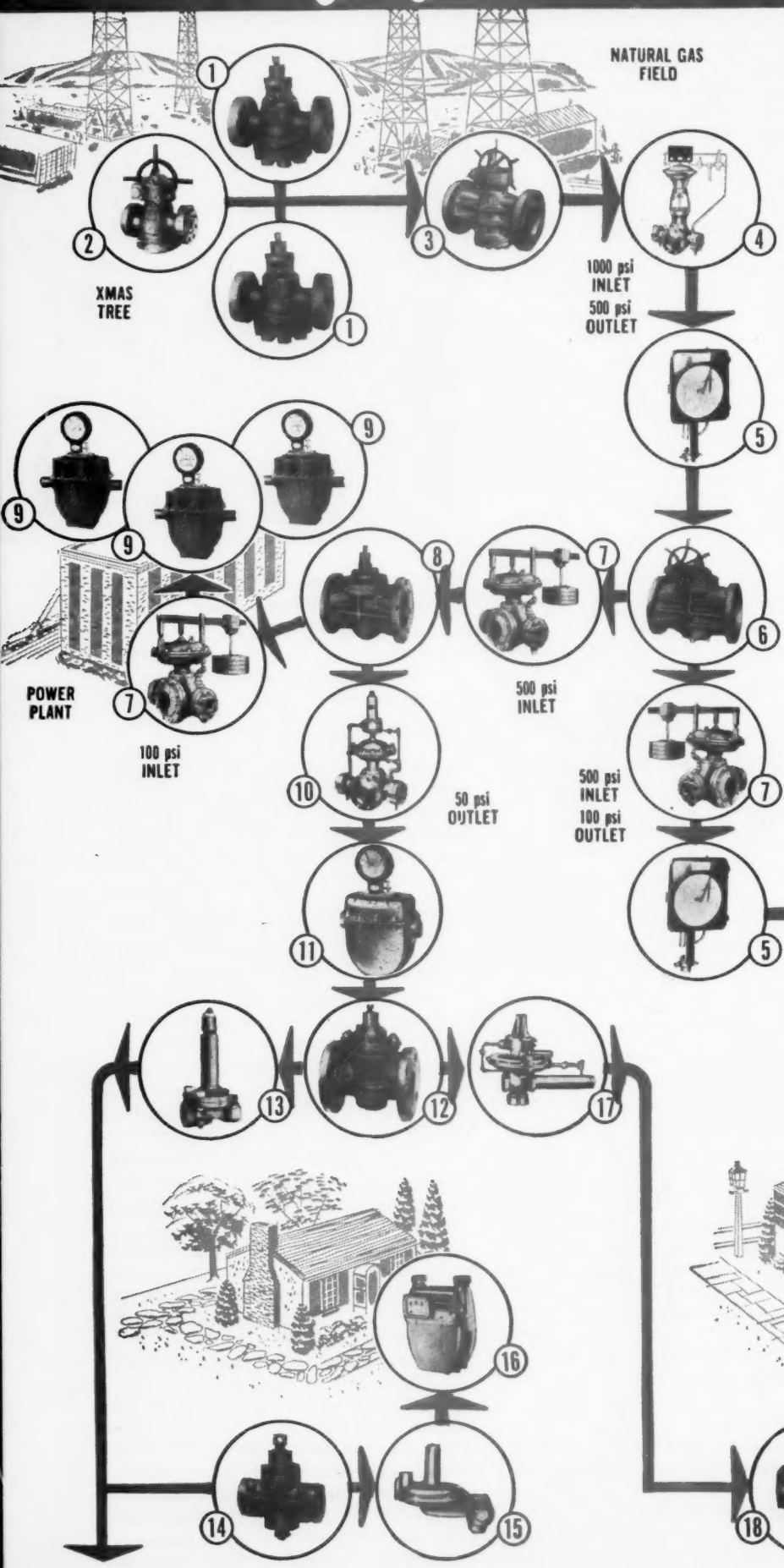
Sled type boring machine with power drive on winch and pump. Illustration at left shows details, including winch chain drive, air motor with pulley, etc., and, at bottom center, a new spiral type bit for clays and adobe soil.

Mechanization and organization of gas service installations was the subject of a paper presented at the distribution conference of the Pacific Coast Gas Ass'n at Fresno, Calif., on April 27-28.

It is presented to American Gas Journal readers in two parts. This is Part 2; Part 1 was printed in the April issue.

Mr. Currens is superintendent, gas operations, northern area, PG&E.

How many of these ROCKWELL - EMC



Most gas men will do quite well on t
little quiz because a majority of the pr
ucts pictured here have been basic to
in the gas industry for many years.

A study of this schematic diagram reve
the complexity of the gas business a
its scope. It also reveals the fact t
from well-head to consumer, the Di
sions of Rockwell have engineered t
most complete line of meters, regulato
and valves to handle every possible co
dition of pressure and volume. Unqu
tionably Rockwell products ha
contributed more to accurate gas me
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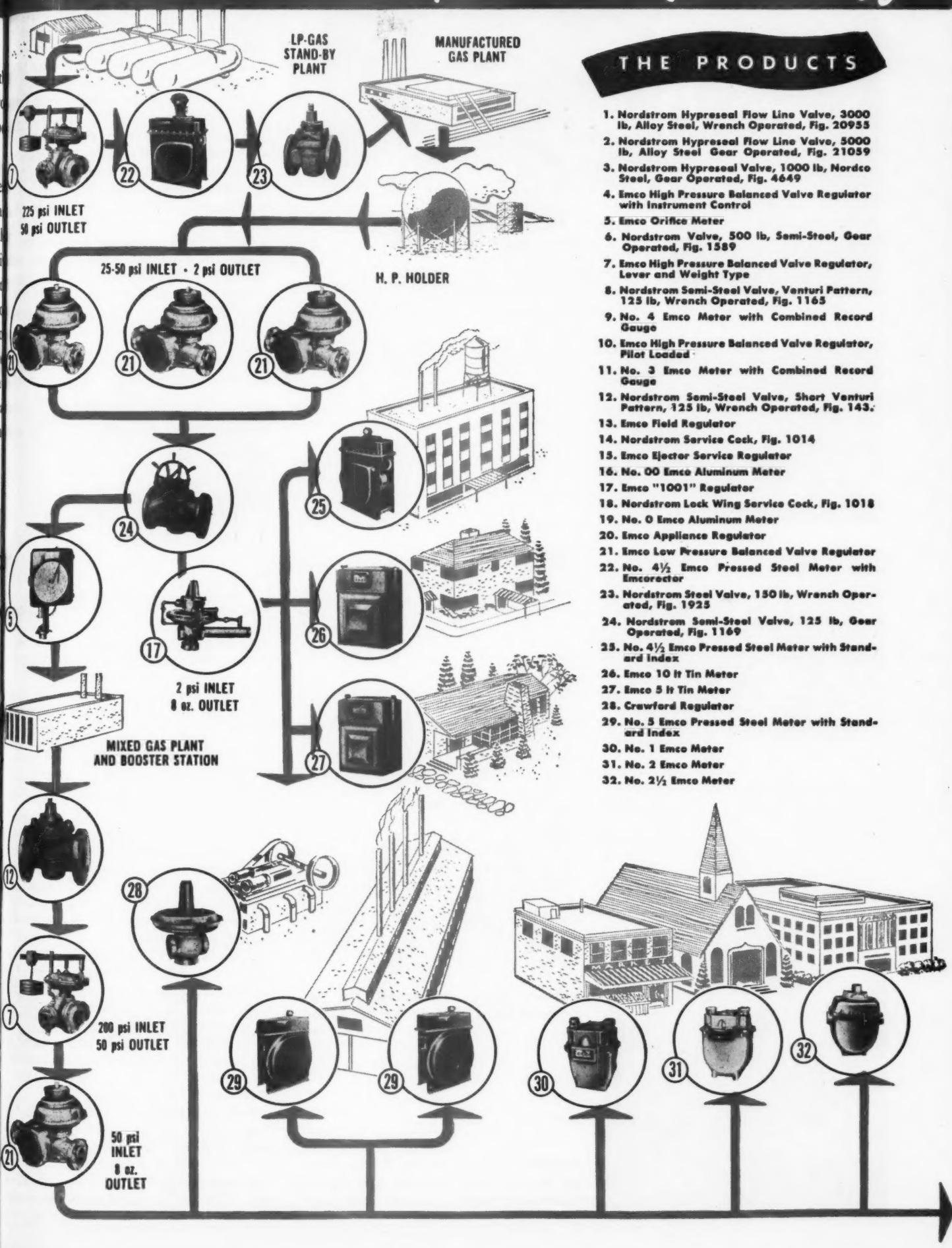
LP-GAS STAND-BY PLANT
MANUFACTURED GAS PLANT
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25-50 psi INLET • 2 psi OUTLET
H. P. HOLDER
2 psi INLET 8 oz. OUTLET
MIXED GAS PLANT AND BOOSTER STATION
200 psi INLET 50 psi OUTLET
50 psi INLET 8 oz. OUTLET

THE PRODUCTS

1. Nordstrom Hypreseal Flow Line Valve, 3000 lb, Alloy Steel, Wrench Operated, Fig. 20955
2. Nordstrom Hypreseal Flow Line Valve, 5000 lb, Alloy Steel Gear Operated, Fig. 21059
3. Nordstrom Hypreseal Valve, 1000 lb, Nordco Steel, Gear Operated, Fig. 4649
4. Emco High Pressure Balanced Valve Regulator with Instrument Control
5. Emco Orifice Meter
6. Nordstrom Valve, 500 lb, Semi-Steel, Gear Operated, Fig. 1589
7. Emco High Pressure Balanced Valve Regulator, Lever and Weight Type
8. Nordstrom Semi-Steel Valve, Venturi Pattern, 125 lb, Wrench Operated, Fig. 1165
9. No. 4 Emco Meter with Combined Record Gauge
10. Emco High Pressure Balanced Valve Regulator, Pilot Loaded
11. No. 3 Emco Meter with Combined Record Gauge
12. Nordstrom Semi-Steel Valve, Short Venturi Pattern, 125 lb, Wrench Operated, Fig. 143.
13. Emco Field Regulator
14. Nordstrom Service Cock, Fig. 1014
15. Emco Ejector Service Regulator
16. No. 00 Emco Aluminum Meter
17. Emco "1001" Regulator
18. Nordstrom Lock Wing Service Cock, Fig. 1018
19. No. 0 Emco Aluminum Meter
20. Emco Appliance Regulator
21. Emco Low Pressure Balanced Valve Regulator
22. No. 4½ Emco Pressed Steel Meter with Emcorector
23. Nordstrom Steel Valve, 150 lb, Wrench Operated, Fig. 1925
24. Nordstrom Semi-Steel Valve, 125 lb, Gear Operated, Fig. 1169
25. No. 4½ Emco Pressed Steel Meter with Standard Index
26. Emco 10 lt Tin Meter
27. Emco 5 lt Tin Meter
28. Crawford Regulator
29. No. 5 Emco Pressed Steel Meter with Standard Index
30. No. 1 Emco Meter
31. No. 2 Emco Meter
32. No. 2½ Emco Meter

FROM PRODUCER TO CONSUMER

Above: No. 1 crew, showing jeep trencher with auxiliary frame.

Left: No. 1 crew, showing split back-filling blade.

No. 2 crew, showing truck carrying boring machines and welding outfit.

The final or No. 3 crew, showing standard truck used on services job.

Equipment carried by No. 3 crew, showing tar pot, welding outfit, and tapping equipment, and pneumatic equipment on side.

Various digger teeth used. The two-pronged bit is used on the boring machine.

trencher has successfully operated which does not have either a track or successful four-wheel drive. To be completely successful, the ideal trencher tractor should have equal weight on the front wheels and the back wheels. The Power Horse illustrated has the unique specifications of 60 per cent of the weight on the front wheels and 40 per cent on the back. With the split blade mounted on the front and a proper trencher mechanism mounted on the back, a very fine and well balanced trencher unit should result.

The split blade, that is a blade which angles to the center from each side of the trench, which is necessary when the soil is delivered to both sides, has been fairly successful. We still feel that the load is a little heavy for the jeep and as soon as possible we would like to try the spirals

The jeep selected for service installation work on a production line basis.

for back filling. Preliminary checks have shown that it has possibilities. All that would be necessary would be to reverse the spirals on the jeep trencher boom and return the dirt to the trench rather than deliver the dirt away from the trench. The back filler blades would be faster and less wear would result.

On the whole, the jeep has done a good job as far as mobility is concerned which is one of the principal requirements for mechanization of wide-spread and scattered service installations. The jeep works well on the customer's property with a minimum of damage and objections.

We do not feel that we have arrived at the 100 per cent trencher at the moment. We are hopeful that very soon we will have a machine which will answer all of our requirements and all of the specifications which have been set up by gas superintendents since about 1941.

With all of the study and interest in the subject, as demonstrated throughout the country this year, we believe the solution is very near.

With equipment in order, the test at Napa was run with the three crews. Trenching by No. 1 crew proceeded very fast and on a five-day run the assignment was completed a day ahead of time. The No. 2 crew, or boring crew, encountered some very bad bores, rock

TABLE 1—DISTANCE TABLE—5-DAY TEST

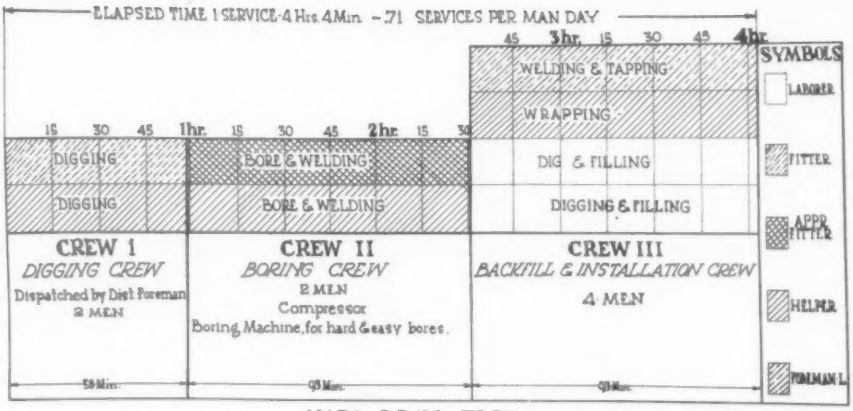
Location	Number of Services	Dist. from Napa	Total Circuit for Day
Napa	20	3	13
S. of Yountville	3	7	23
Yountville	3	9	27
St. Helena	1	27	56 miles

and shales, but in spite of these handicaps finished three-quarters of a day ahead of the final crew. No. 3 crew doing the final installation work of tapping and backfilling ran to the end of the five-day test. The results, as shown in Table 3, cover the first day of the test only. The costs are lower than we expected and the output of over one and one-quarter services per man per day is better than we think we can maintain. Quick calculations from the data on a four-day run indicated that the output would be in the order of three-quarters of a service per man per day which is good for the Napa territory.

We believe now that production line output for districts more favorable than Napa will better the three-quarters service per man per day rate. In Napa we are applying production techniques in a territory not as favorable as could be found in our larger population centers. We are hoping that more tests will be run during the summer in this type of work. As we study the problem, we are constantly encountering shortcuts and new techniques which help. Our No. 2 crew started using tar pots of the standard type which were abandoned for the impregnated tapes which gave a ready-to-apply wrapping without the use of burners or melting apparatus. The tapes furnished by a standard manufacturer are applied with a soft flame of the welding torch or a special acetylene torch.

The crews were very fine in their attitude toward the whole test, and while they were warned continually to keep their pace to normal working rate, they often delivered at higher rates than we believe we should attempt to maintain. This advantage was obviated in several

(Continued on page 58)



NAPA 5 DAY TEST

Total Footage 2712 - Total Services 27 - Total Hours 304 - Total Cost $515.62 - Cost per foot 19.06¢ - Average length of service 100.63 Feet

Chart 5—"Field results"—Gas service installation as mechanized and organized.

AUTHOR'S NOTE

Crew 3 contains four men. This is not the way we recommend for final operations. Crew 1 was furnished by a contractor whereas when Crew 1 is furnished by the company one laborer will be taken from Crew 3 for Crew 1.

The weather conditions were too wet for optimum operations. The services were not grouped as in the subdivision type construction but were general run as shown by Table 1. The mechanized and organized method showed a 42 per cent improvement in services per man day over the "as found" method, and we believe that this can be improved after equipment and personnel have been better oriented.

TABLE 2—RESULTS OF 5-DAY TEST RUN

Date: March 16-24, 1950.
Weather: Variable, Rain and Clear.
Soil conditions: Too wet for optimum operations.
Service concentration: Average for this district. Three to 27 miles separation between groups.
Services completed: 27
Total length of services: 2717 ft.
Average length of service: 100.63 ft.

	Rate/day	Rate/hr.	Hours	Cost/man
CREW I				
Trencher operator	14.87	1.86	26	$48.36
Helper	13.13	1.64	26	42.64
CREW II				
Apprentice fitter	14.36	1.80	42	75.60
Helper	13.13	1.64	42	68.88
CREW III				
Foreman light	16.10	2.01	42	84.42
Helper	13.13	1.64	42	68.88
Laborer	12.11	1.51	42	63.42
Laborer	12.11	1.51	42	63.42
		Total labor cost		$515.62

Labor cost per service $\frac{\$515.62}{27} = \$19.10$

Labor cost per ft. of service $\frac{515.62}{2717} = 18.98¢/ft.$

Services per man per day $= \frac{27}{38} = .71$

TABLE 3—RESULTS OF FIRST DAY DURING TEST RUN

Date: March 16, 1950.
Weather: Clear and Cool.
Soil Conditions: Good for field operations. Two rocky bores.
Service concentration: Average for this district. Four miles separation between groups.
Services completed: 9
Total length of services: 492 ft.

	Rate/day	Rate/hr.	Hours	Cost/man
CREW I				
Trencher operator	14.87	1.86	6	$11.16
Helper	13.13	1.64	6	9.84
CREW II				
Apprentice fitter	14.36	1.80	6	10.80
Helper	13.13	1.64	6	9.84
CREW III				
Foreman light	16.10	2.01	8	16.10
Helper	13.13	1.64	8	13.13
Laborer	12.11	1.51	8	12.11
Laborer	12.11	1.51	8	12.11
		Total labor cost		$95.09

Labor cost per service $\frac{\$95.09}{9} = \$10.57$

Labor cost per ft. of service $\frac{\$95.09}{492} = 19.3¢/ft.$

Man days $\frac{56}{8} = 7$

Services per man per day $= \frac{9}{7} = 1.286$

Index of Yields : Selected Utilities Stocks

	Apr. 1950	Mar. 1950	Feb. 1950	Jan. 1950	Dec. 1949	Nov. 1949	Oct. 1949	Sept. 1949	Aug. 1949	July 1949	June 1949	May 1949
Natural Gas Transmission Companies	4.77%	4.57%	4.83%	5.02%	4.75%	4.85%	5.15%	5.25%	5.38%	5.53%	5.82%	5.23%
Natural Gas Transmission & Distribution Companies	5.14	5.19	5.26	5.23	5.26	5.58	5.61	5.73	5.62	5.72	5.97	5.55
Manufactured & Mixed Gas Companies	4.77	4.71	4.75	4.62	4.75	4.94	5.07	5.16	5.40	5.22	5.46	5.30
Class "A" Electric Companies	5.24	5.15	5.38	5.40	5.48	5.49	5.53	5.58	5.74	5.86	6.02	5.70
Class "B" Electric Companies	5.37	5.42	5.37	5.47	5.68	5.77	5.96	5.72	5.89	6.02	6.05	5.75

Method of Compiling Index of Yields

This is a straight arithmetical index of comparative yields obtainable on a selected group of gas and electric utility industry common stocks.

The companies comprising this index have been selected by the AMERICAN GAS JOURNAL as providing a representative cross-section of each industry, from the standpoint of geographical diversification and of the relative importance of the individual companies in their areas.

No effort has been made to weight the average to give effect to changes in capitalization or in dividend rates because the yields afforded on the issues reflect such changes. The index is designed to show the rate of return and not necessarily market movements on the stocks comprising it.

The companies used in compiling this index are:

Natural Gas Transmission Companies: El Paso Natural Gas Co.; Northern Natural Gas Co.; Panhandle Eastern Pipe Line Co.; Southern Natural Gas Co.; Tennessee Gas Transmission Co.

Natural Gas Transmission and Distribution Companies: Columbia Gas System, Inc.; Consolidated Natural Gas Co.; Lone Star Gas Co.; Oklahoma Natural Gas Co.; Pacific Lighting Corp.

Manufactured and Mixed Gas Companies: Bridgeport Gas Light Co.; Brooklyn Union Gas Co.; United Gas Improvement Co.; Peoples Gas Light & Coke Co.

Class "A" Electric Companies: Boston Edison Co.; Commonwealth Edison Co.; Houston Lighting & Power Co.; Southern California Edison Co., Ltd.

Class "B" Electric Companies: Dayton Power & Light Co.; Hartford Electric Light Co.; Pennsylvania Power & Light Co.; Public Service Co. of Colorado; San Diego Gas & Electric Co.

AVERAGE prices for public utility common stocks have slipped back to their level of about a month ago. This is reflected in the spotty tendencies shown by the various groups making up the AMERICAN GAS JOURNAL index.

The trend is due chiefly to changing psychology on the part of stock purchasers, rather than to any adverse developments in the utility industry picture.

Leading financial advisory organizations are adhering to their previous cautious attitude to invest or reinvest funds only on the most selective basis, instead of plunging into a race to get ahead of trustees and institutional investors.

Prices for gas industry equities, especially in the natural gas classification, recently have dropped fairly sharply in price. Part of the reason for this may rest with dissatisfaction over Presidential veto of the Kerr Bill and with lower earnings still being reported by leading companies in the industry.

The chief reason seems to be, however, with the market itself since qualified financial observers had stated just prior to the recent drop in market prices for utility equities that swings in stock prices are likely to be both wider and more erratic than heretofore as public participation in the stock market expands.

Several factors are pointed to in support of this observation. To date in 1950, turnover on the New York Stock Exchange has more than doubled the volume for the corresponding 1949 period. In fact, present pace of trading in stocks has been exceeded on only a comparatively few occasions in recent years.

According to figures released by the Securities and Exchange Commission, purchases of corporate securities by individuals have been at the highest level reached in a decade.

The volume of new utility financing, meanwhile, continues at a high level, the combined amount of utility bonds, preferred and common stocks brought to market in March of this year totaling approximately $277 million, or more than one-half of the month's total of $474.7 million of all types of corporate securities.

About three-fifths of this utility volume has comprised bonds and these were marketed on yield bases ranging from the low 2.60's to the upper 2.70s'. Only a slight increase has occurred in the yield return afforded on high grade utility bonds (to 2.60 per cent from the previous recent low of 2.57 per cent) due chiefly to the uncertainties entertained by institutional investors concerning forthcoming financing by the U. S. Treasury.

This is also expected to prove to be only a temporary situation and not one which should impede successful marketing on a comparatively low yield basis of the substantial volume of new utility securities which still have to find their way to market.

Stockholders Want to Know Everything

STOCKHOLDERS in corporate enterprises are being given more consideration than ever before. Annual reports have been considerably embellished during recent years and managements of numerous companies have been going to great lengths to aid and abet attendance at annual meetings.

Both steps are constructive, but much more will have to be done if the investor is to receive the information to which he is entitled.

This is attested in the results of two surveys made of analysts of investment firms, one made by the writer and the other by the chairman of the utility division of the New York Society of Security Analysts.

The importance of the opinion of analysts is demonstrated by the fact that their recommendations account for about two-thirds of all stock purchases by individuals.

The information divulged supports the warnings given in this section of AMERICAN GAS JOURNAL in January and February that gas company managements should give stockholders and prospective investors all the information possible, that they should make it complete and up to date and that they should stress prospects whenever possible.

Reactions coming to the writer are that "gas companies generally are behind the electric utilities in the practice of issuing interim reports . . . . and

(Continued on page 54)

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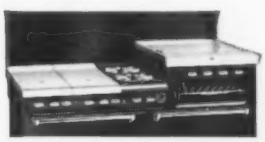
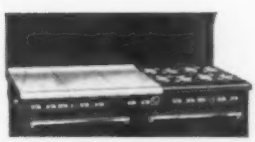
NATIONAL RESTAURANT WEEK

May 8th to 14th



No. 83-2. Two hot top sections, one open grate section, griddle, broiler and two ovens.

No. 84-3. Three hot top sections, two open grate sections with four giant open burners. Two ovens.



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News of the Gas Industry

Truman Vetoes Kerr Bill On Natural Gas

President Truman on April 15 vetoed the Kerr natural gas bill, which would have prevented Federal regulation of rates charged by independent producers. He said the bill "would not be in the national interest."

Harold Kahler, of Sprague Meter, Dies Suddenly

Harold Kahler

Harold Kahler, a veteran employe of Sprague Meter Co., died suddenly at his home in Oklahoma City late in January.

Mr. Kahler joined Sprague in 1923 as a service man. In 1926 he became one of the company's nine sales engineers, with headquarters at Davenport, Iowa. The office was moved to Oklahoma City 13 years ago.

He was a member of the AGA, and the Southern and Mid-West gas associations.

Gas Machinery Gets Patent From British Office

The Gas Machinery Co., Cleveland, has been granted a patent by the British Patent Office relating to the production of oil gas, using various types of process oil and with oil as a fuel for heating. Under this method generators can be made in many different sizes and types of construction to carry out the various processes which are possible.

Processes described under the patent are similar to those which have been installed in the United States and Canada during recent years by The Gas Machinery Co. The company also holds numerous other United States, British, and Canadian patents in this field.

The patent is a basic one for the production of oil gas. Much of the original development was carried out by Hugh M. Blain, of New Orleans, with the process and equipment further improved, modified, and expanded by Gas Machinery. Some of the improvement patent applications and applications for other processes and equipment are still pending.

Annual Production and Chemical Conference Will Be in New York May 22-24

Advances in gas making will be discussed at the Production and Chemical Conference sponsored by the Operating Section of the American Gas Association at the Hotel New Yorker, New York City, May 22, 23 and 24.

The opening day of the conference will be given over to general sessions. Monday morning will be devoted to problems of the chemical division of the industry, and G. V. McGurl, chairman of the AGA Chemical Committee, will preside. H. Carl Wolf, managing director, AGA, will bring a message from the Association, and T. Lee Robey, coordinator of Gas Production Research, will report on the progress made in the Association's efforts to improve gas production methods under the continuing research program. Delegates will be given a first-hand report on the Hall high Btu process by Gordon G. Howie, Cambridge Gas Light Co.

G. A. S. Cooper, Public Service Electric & Gas Co., Newark, will talk on "Accidents—Almost," stressing ways and means of reducing accident tolls.

R. L. Brown, U. S. Bureau of Mines, will give the delegates the Government's estimates of how much coal is suitable for making coke.

A varied program covering phases of gas production has been arranged for the afternoon session under the guidance of J. P. Stephens, chairman of the Gas Production Committee. Subjects include plant waste disposal, by W. B. Hart, Atlantic Refining Co., Philadelphia; public health service water pollution control, by L. F. Warrick, US Public Health Service, Washington; maintenance of standby water gas plants, by H. G. Kaess, Minneapolis Gas Co.; and a symposium on reforming of hydrocarbon gases, under leadership of J. L. Turnan, Worcester Gas Light Co. Outstanding authorities in different methods of reforming hydrocarbon gases will participate in the symposium.

The second day of the conference will include parallel sessions of the chemical and production branches. The chemical committee will conduct a symposium covering various projects of the gas production research and development program of the US Bureau of Mines. Interchangeability of fuel gases and gas leak detection practices also will be covered.

The gas production meeting will treat such subjects as replacement of natural gas send-out; use of oxygen in the manufacture of blue gas; controlled gas mixing; safety in operation of LP-gas plants and gas analyses.

Luncheon conferences are scheduled for both Tuesday and Wednesday, and a list of topics has been arranged under such group headings as carbonization and coke; high Btu gas; oxygen and its application to gas making; chemistry in the gas industry; LP-gases and water gas. Tuesday's luncheon will be devoted to gas production subjects while on Wednesday the discussions will cover the chemical phase of gas making.

Mr. McGurl will again preside at the general session of Wednesday. Odorization practices, corrosion and tar treatment are among the subjects listed. Underground storage of natural gas will be discussed, and E. S. Pettyjohn, director, Institute of Gas Technology, Chicago, will deliver a paper on evaluation of oils for carburetted water gas operation.

D. J. Reimers Elected President of Mid-West Gas Ass'n

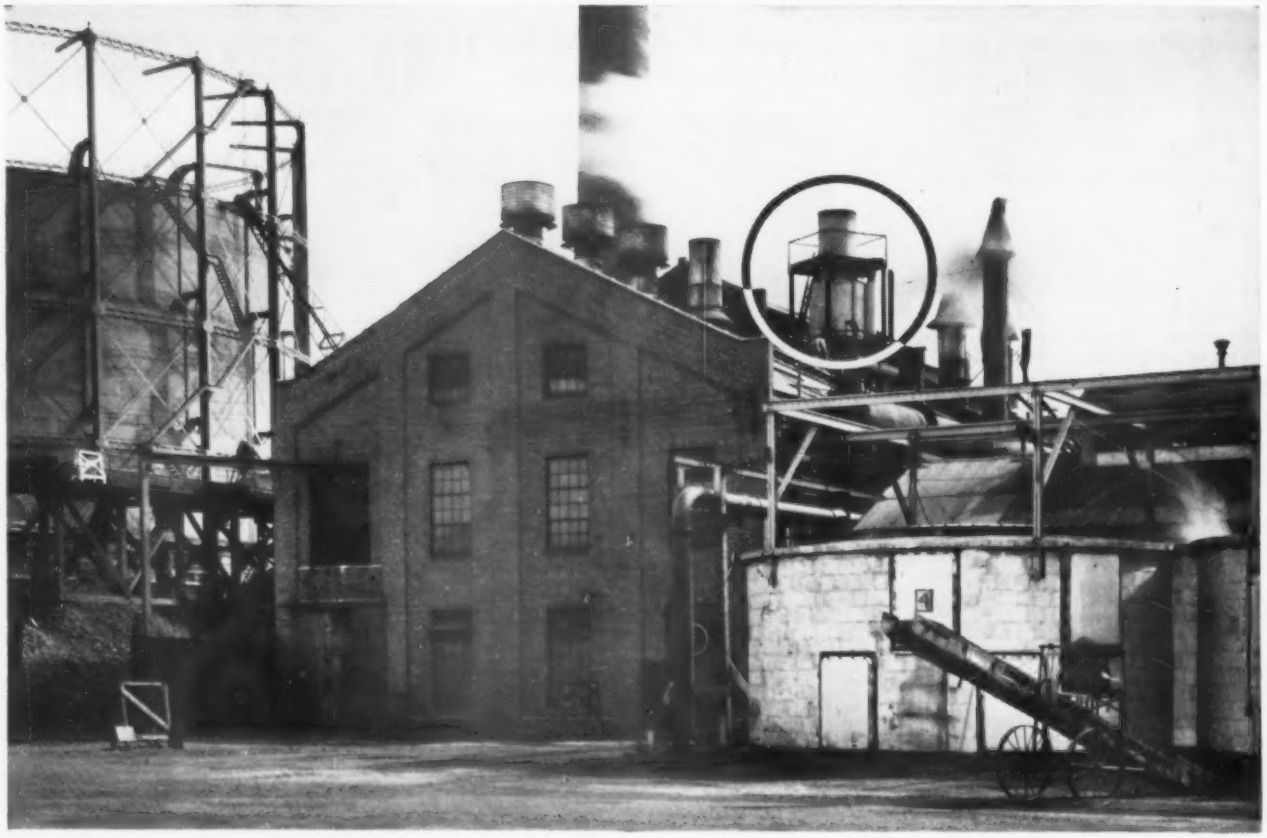
The 45th annual meeting of the Mid-West Gas Association was held at St. Paul, Minnesota, April 10, 11 and 12, with record attendance and a comprehensive program of sales, management and operating subjects. Registration was 375, with 421 attending the annual banquet.

D. J. Reimers, vice-president and general manager, Minnesota Valley Gas Co., St. Peter, Minn., was elected President; Larry Shomaker, superintendent of sales, Northern Natural Gas Co., Omaha, first vice-president, and A. H. Abbott, gas engineer, Northern States Power Co., Minneapolis, second vice-president. Harold E. Peckham, gas superintendent, Northern States Power Co., was re-elected secretary-treasurer.

Home service subjects were carried on the program as a special feature. Jessie McQueen, home service counsellor, American Gas Association, headlined the presentation.

Hugh H. Cuthrell, President, AGA, and W. Paul Jones, President of Servel, Inc., were among the speakers.

H. Carl Wolf, managing director of AGA, and H. M. Smith of Waterloo, Iowa, a past President of the association, now retired from the Iowa Public



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After 5 years of research and 2 years of test-operation, Buell offers a new Collector for Water Gas Sets. Outstanding advantages of the collector over equipment previously in existence are: no moving parts, no floor space required—easily installed in existing plants, no additional flare-back, no back pressure on superheaters, and no fans or motors required.

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Service Co., were elected to honorary memberships in the association.

Announcement was made that the 27th Mid-West Gas School and Conference will be held at Iowa State College, Ames, Sept. 14 and 15. Omaha was chosen for the next annual convention.

The following were elected to the executive council to serve from 1950 to 1953; E. G. Burwell, Casper, Wyoming; P. C. DeHaan, Des Moines, Iowa; George B. Johnson, Minneapolis; E. J. Werthman, Davenport, Iowa.

Election of AGA Affiliation Representatives was as follows: Accounting, L. M. Spence, Council Bluffs, Iowa; Industrial, W. V. Bell, Omaha; Operating, Geo. G. Holmes, Lincoln, Neb., and Residential, Frank Soldan, Hastings, Neb.

A. P. Lathrop Dies in Retirement After Long Utility Career

Alanson P. Lathrop, who retired in 1935 as President and board chairman of the American Natural Gas Co., died on April 14 at Irvington, N. Y. He was 90 years old.

Mr. Lathrop became associated with the natural gas company ten years before his retirement, when it absorbed the American Light and Traction Co., of which he had been President.

Born in Norwich, Conn., Mr. Lathrop entered the utilities field as a young man with the Columbus Gas Light and Coke Co., Columbus, Ohio. He later became President of its successor, the Columbus Electric Co.

Successively thereafter, Mr. Lathrop was vice-president and general manager of the St. Paul Electric Co., and held the same positions with the Detroit City Gas Co. In 1906 he became vice-president of American Light and Traction.

Brooklyn Union Promotes A. D. Harrison

A. Dudley Harrison, formerly engineer of manufacture, was named assistant to chief engineer of the Brooklyn Union Gas Co. recently.

Mr. Harrison has been with Brooklyn Union since 1928.

On April 1, 1945, he became assistant general superintendent of Greenpoint works. Subsequent positions included assistant engineer of manufacture, engineer of development and planning, engineer of manufacture.

Ervin Calhoun Dies

Ervin Calhoun, 50 year veteran of Philadelphia Gas Works, died suddenly on April 14. He was 70.

Mr. Calhoun became associated with Philadelphia Gas Works in 1900. Serving in various capacities through the years, Mr. Calhoun was manager of the stores department at the time of his death. His entire service with the gas company was devoted to services of supply. His 50th anniversary with the company was observed last January 12.

Norman R. McKee Retires as VP of Southern Counties

Norman R. McKee

Norman R. McKee, vice-president of Southern Counties Gas Co. of California, brought to a close a long career in the utilities business in Southern California when he went into retirement on May 1. At the time of his retirement he had completed a little over 35 years' service with the Southern Counties Gas Co., and around 47 years in the gas and oil business in Los Angeles.

A native of Toronto, Canada, McKee came to California in 1903. He found employment first with the old Los Angeles Gas & Electric Corp., remaining with that firm for four years. From 1907 to 1915 he was with the Associated Oil Co., and the Standard Oil Co. successively. Then he joined the Southern Counties Gas Co.

With the purchase of the Edison Company properties in Santa Monica by Southern Counties in 1916, McKee was made division manager of the Santa Monica Bay division. He remained in that post until 1918 when he became sales engineer, with headquarters in the Los Angeles office. In 1924 he was made purchasing agent, retaining that position until 1934, when he was elected vice-president in charge of sales, purchasing and public relations functions.

Mr. McKee is a past President of the Pacific Coast Gas Association.

A. E. Higgins with GE

A. E. Higgins, formerly vice-president of Rockwell Manufacturing Co., has been given the newly created position of manager, gas utility relations, air conditioning department, General Electric Co.

Mr. Higgins has been associated with the gas industry since 1927.

In 1931 he was made secretary of the Natural Gas Department of the American Gas Association. He served in this capacity until 1937 when he became vice-president of the Pittsburgh Equitable Meter Co. and the Merco Nordstrom Valve Co., since merged to form the Rockwell Manufacturing Co.

FPC Gives Commonwealth OK To Proceed in Virginia

The Federal Power Commission on Mar. 31 issued an order authorizing Commonwealth Natural Gas Corp., of Lynchburg, Va., to construct a 200 mile pipe line which will serve natural gas markets in Virginia.

In a concurrent order, the FPC denied the portion of the application of Piedmont Natural Gas Corp., of Spartanburg, S. C., which proposed to serve markets in the Tidewater area of Virginia, but reopened that proceeding insofar as it relates to Piedmont's plans to supply natural gas to the Piedmont region of the Carolinas.

In its order approving the Commonwealth project, the Commission authorized Virginia Gas Transmission Corp., of Charleston, W. Va., to deliver and sell 55,000,000 cu. ft. of gas per day to Commonwealth. In addition, Tennessee Gas Transmission Co., of Houston, Tex., was authorized to sell 20 billion cu. ft. of gas per year to United Fuel Gas Co. for resale to Virginia Gas to enable the latter company to supply Commonwealth's requirements.

The Commonwealth project, estimated to cost approximately $6,425,000, will carry natural gas to Richmond, The Petersburg and Hopewell Gas Co., Suffolk Gas Co., Portsmouth Gas Co. and Virginia Electric and Power Co. in the Norfolk and Newport News areas, and to the Solvay Process plant of the Allied Chemical and Dye Corp. at Hopewell.

Commonwealth's line will connect with Virginia Gas Transmission's system in Greene County, Va., and extend to Norfolk and Newport News. Virginia Gas Transmission will construct a measuring and regulating station at the point of connection.

Commonwealth and Virginia Gas were directed to commence construction of the newly-authorized facilities by July 1.

In its order relating to the Piedmont application, the Commission said that because of the need for natural gas in the Piedmont area of the Carolinas and the showing already made by the applicant, the proceeding should be reopened for the purpose of allowing the company to amend its application to serve the Piedmont area and to produce further evidence if it so desires. Piedmont was directed to act within 60 days.

The Commission said that Piedmont has not shown that it has committed to it a sufficient natural gas supply to sustain its proposed annual deliveries of approximately 62 billion cu. ft. for a reasonable period. However, FPC continued, its gas supply may be adequate to meet the presently indicated requirements of consumers in the Carolina area for a reasonable number of years if its deliveries are reduced by an amount equal to the volumes it proposed to deliver in the Virginia area.

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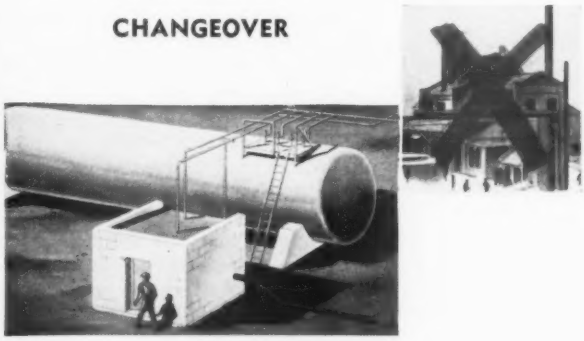

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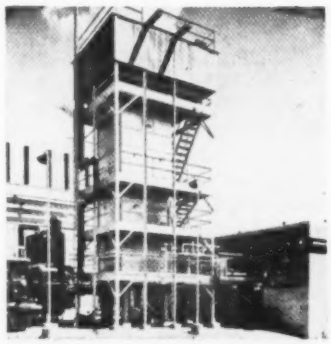
Propane for Peak Loads



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Propane Enriching Plants
Equipment for Changing to Propane of 29 Gas Plants in France
36 Propane Stations for Italy
Propane Storage, Vaporizing, Unloading Plants
16 Compressor Units for a Total of 8,000 HP
4 Steam Turbine Units for a Total of 2,000 HP
10 Electric Tar Precipitators Totaling 80,000,000 CFD
7 Hydroscavenger Units
3 Gas Utilities Operated by Our Subsidiaries
1 Bottle & Bulk Gas Distribution

PAST — WE HAVE COMPLETED:

20 Central Propane Storage and Distribution Systems (in 6 States, U. S. A.)
3 Propane-Air Changeovers of Gas Plants (in New England)
Equipment for Installation of Natural Gas Pipeline (500 Miles) (Argentina)
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25,000 Appliances Installed
1,000,000 Feet of Pipe Installed
400,000 Gallons of Propane Storage Installed
10,000,000 Pounds per Year of Propane Distributed

Stockholders Want

(Continued from page 48)

that some of the smaller gas companies have been especially remiss in respect to the adequacy of stockholder information." This is a sad commentary at a time when gas companies will have to compete with electric utilities for available investor dollars.

First and foremost, it is pointed out that much work still has to be done in improving annual reports—not by spending large sums for elaborate pictures and color but by giving complete details of operations in facts and figures. In addition, management will do well to consider including in the report a section devoted "To The Analyst." Information in such sections should include a five or ten year (preferably the latter) comparative breakdown of sales and revenues by classes of customers and certain other physical and financial data.

As an absolute minimum gas companies should issue reports quarterly. This is a recommendation not only of all segments of the financial field but also was stressed very strongly by Commissioner Donald C. Cook of the Securities and Exchange Commission recently when he told a gathering of New York analysts: "It is difficult to see why all utilities in the electric and gas industries should not, at a minimum, publish quarterly earnings data. Indeed, the time will come when utility investors, some of whom are required to make important investment decisions almost daily, will demand monthly earnings data from these industries. Publication of quarterly and monthly data not only keeps investors informed but also serves the additional function of keeping management on its toes."

Because of the sharp fluctuations between different quarters for gas companies, the quarterly release should on a twelve months' earnings basis.

In fact, investment houses now seek twelve months' earnings published each month so that they can keep closer tab on results.

When issued quarterly, these interim statements should include a comparative balance sheet. This is a point on which the analysts are unanimous. In addition, they should be accompanied by information concerning the progress of the company and some statistical data.

Equally important, the information published should be uniform. Output should be stated on a cubic foot basis.

"Gas companies with securities in the hands of the public do very well to make personal contacts occasionally with large stockholders," one of the leading analysts states, "and with those investment banks and institutions who have been particularly interested in the stock and are in a position to furnish advice and information to small holders.

"Appearances before such groups as the analyst societies in the various cities where the company's securities are widely held are much to be desired. If a company does not have anyone in its own organization who is a specialist in this kind of work, I think they may do very well to contemplate engaging some outside help because the work is much too important to be neglected."

The great body of analysts are in accord that gas company managements should make personal appearances before them. Of the total number queried approximately 80 per cent are of the opinion that such appearances should be not more than two years apart. In fact, the majority suggests that gas companies make such appearances an annual event.

Conditions have changed considerably during recent years and companies in the gas industry appear to the writer to have been doing their share of giving stockholders information. These suggestions outlined above are set forth to guide management in doing a still better job along this line.

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1200 Attend Annual Meeting Of Southern Gas Ass'n

Three main topics highlighted the annual convention of the Southern Gas Association at Galveston, Texas, on March 27-29. They were:

1. Industrialization of the south and southwest. Delegates heard about some of the active promotion being done by various organizations.
2. The problem of statism.
3. The timely subject of employee relationships. There was praise for stable conditions within the industry, and hints were given that should make for even better relations in the future.

A total of 1,164 delegates registered for the convention. Carl H. Horne, of Alabama Gas Corp., Birmingham, was elevated to the presidency of the association at the closing session. He had served as first vice-president during the last year.

L. L. Dyer, Lone Star Gas Co., Dallas, was elected first vice-president, and J. H. Wimberly, Houston Natural Gas Corp., second vice-president. Re-elected were Treasurer H. V. McConkey, Southern Union Gas Co., Dallas, and Secretary E. T. Anderson, Atlanta Gas Light Co., Atlanta.

Directors elected for a three-year term are Charles S. Coates, Tennessee Gas Transmission Co., Houston; J. H. Collins, Sr., New Orleans Public Service, Inc.; H. K. Griffin, Mississippi Gas Co., Meridian, and A. B. Parker, Hardwick Stove Co., Houston.

Gov. Sidney S. McMath, of Arkansas, pointed out that the south is the logical place for industrial supremacy, because of its natural resources. (Louisiana, Oklahoma, Texas, New Mexico and Arkansas, for instance, contain 87 per cent of the nation's gas reserves.)

Evidence of the way the "new frontier" is being publicized was given by L. M. Tognoni, of New Orleans, director of the Middle South Area office. Four utility companies in Louisiana, Arkansas and Mississippi have set up this office to spread the word about advantages of their tri-state area. Their goal is stimulation of economic development by promoting industry, commerce and agriculture.

Hugh H. Cuthrell, President of the American Gas Association and vice-president, Brooklyn Union Gas Co., said: "We must tell the public how we run our business. If rates are increased, they must know the truth in detail. Telling how we run things will bring about more confidence and this confidence will bring about a defeat of Communist infiltration."

A bouquet to the industry was handed out by Merlyn S. Pitzele, labor editor of *Business Week*, who said: "The gas industry is singularly fortunate by being unburdened by a tradition of past mistakes in its employee relations."

Predicting the year ahead, Mr. Pitzele forecast a stable, gradually declining cost of living for the next 12 months, with little expectation of any new strike records. There will be an opportunity to develop employee relations policies in a somewhat quieter air than has characterized the labor front since the war ended.

Mr. Pitzele said the Taft-Hartley act has had profound and far-reaching effects on labor: It has committed the unions to political activity on a scale and at a pace never before approached; it has drawn the AFL and the CIO more closely together than at any time since their split in 1936.

Dr. Arthur A. Smith, of Dallas, condemned government encroachment in his address to Tuesday morning's general session. Taking as his topic, "Something for Nothing," Dr. Smith pointed out the fallacies of thinking that the government can support the people when the government's support comes from the people.

A well-received speaker at Wednesday morning's general session was W. Paul Jones of Evansville, Ind., president of Servel, Inc. Discussing "Old-Fashioned Selling."

L. L. Baxter's message as outgoing President of SGA was a challenge to the industry to do something about promoting itself.

Managing Director R. R. Suttle's report hailed the growth of SGA, which now has 62 gas company members and more than 100 manufacturer-distributor members.

Natural Gas Is Coming—Are YOU Prepared?

One Million CF on a Peak Day Could Cost You $45,250.00 Per Year. One Million CF Propane-Air Gas From a Properly Designed Peak Load Plant Would Cost About $990.00. Annual Saving—$44,260.

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29 Gas Plants in France To Be Converted to Propane

Virgil Stark

VIRGIL STARK, President of North American Petroleum Gas Corporation, New York, announces that his company has obtained a contract for supplying all the equipment required for the conversion to propane of 29 manufactured gas plants in France.

Most of the gas industry has now been nationalized in France and operates under a Government agency called Gaz de France.

The majority of the gas plants in France are small. These plants with a production of less than 20,000,000 cu. ft. per year represent 58 per cent of the total number of plants, but they produce only 3.5 per cent of the total gas made. The majority of the plants are coal retort type with production costs much higher than in modern plants. Gas rates have not been raised proportionate to production costs, and most of these smaller plants operate at a loss.

The new contract is for the special equipment required to convert 29 gas plants entirely to propane. Enrichment equipment will also be provided for four larger plants.

Until last year, the production and consumption of propane in France was very small (approximately 3000 tons a year). Prior to the war, propane had been in use in eight small gas distributing systems in France (approximately 800 tons a year) as well as industrially. However, there was a large quantity of butane sold in bottled-gas form.

A parallel program for increasing the capacity of French petroleum refineries calls for a larger production of propane and butane. National capacity is to be increased from a prewar (1938) figure of 6,866,909 tons a year of crude oil throughput to 18,700,000 tons planned for 1953. Based on third quarter 1949 operations, present capacity has reached the 11,400,000 tons a year level.

The yields of propane and butane from refineries represented 0.77 per cent by weight of the crude treated, or 90,244 tons, equivalent to 45 million gallons.

By 1953, the possible refinery yield of propane and butane is visualized at some 140,000 tons per year, of which approximately 60,000 tons will be propane and 80,000 tons butane. An additional 20,000 tons yearly of propane and butane is to be extracted from natural gas.

All of the butane is to be distributed as bottled gas. Before the war there were 1,500,000 bottled-gas consumers in France. However, there will be available a surplus of propane, part of which can be absorbed in gas plants.

The order placed by Gaz de France with the North American Petroleum Gas Corp. includes jet propane-air sets controlled by thermeters with direct and automatic supply to the distributing system—no gas holders being required. The enriching equipment is automatically controlled by calorimixers and calorimeters. There is also included propane equipment for 52 storage tanks, 23 compressors and pumps; 35 vaporizers; equipment for truck tanks, together with a large number of Rockwell propane meters and regulators.

North American will also supervise the erection and testing of equipment. ECA credits are being used to finance the purchases.

Selling the 'Gulf South'

(Continued from page 18)

By helping to develop and improve the economic conditions in the communities served, the company feels that every citizen is benefited directly or indirectly, and that the natural gas industry, including the United Gas companies, will benefit, too.

Annual revenues from sales of natural gas by United to industrial consumers were $12,617,000 in 1939, and were $25,000,000 in 1949, an increase of $12,383,000. Corresponding increases were noted in sales to residential and commercial consumers, many of whom were added as the result of an influx of industrial employees and the establishment of new businesses to serve them.

United, which moved its headquarters to Shreveport, La., in 1940, has been well pleased with results of its Gulf South advertising program. In addition, it runs a regular schedule of public information type advertisements in over 300 daily and weekly newspapers published in the five-state Gulf South area. The distribution divisions of United Gas Corp. have a separate but coordinated schedule of advertisements designed to increase natural gas sales at the local level. These appear in newspapers of communities where United has retail franchises.

Augmenting its public relations program, United Gas spends several thousand dollars each year in promoting

STAMANCO EXPERT HOLDER INSPECTION

-Saves You Money!

Even though your gas holders have had regular attention from your company maintenance crew - it will pay you to have an occasional inspection by STAMANCO Inspection Specialists who are --

EXPERTS in the prevention of trouble development

EXPERTS in the detection of present troubles

EXPERTS on how to best repair damage done

STAMANCO Inspection Service can save you money by extending the life of your present holders....by reducing the possibility of shut-downs due to corrosion and mechanical troubles....by correcting factors which would eventually cause expensive major repairs. We shall be pleased to talk your holder maintenance problems over with you.

The STACEY MANUFACTURING Co.
SINCE 1851
CINCINNATI 16, OHIO
GAS HOLDERS • HI-PRESSURE TANKS • PURIFIER BOXES
ENGINEERS • FABRICATORS • CONSTRUCTORS
An Independent Organization Not Affiliated With Any Other Builders of Gas Holders

4-H Club and other farm youth activities, emphasizing leadership—"the type of leadership that will bring credit and prosperity to our Gulf South area."

To sum up United's Gulf South program, Mr. Wilson says:

"We like to think of this as a demonstration of the American business system in action. Along with the citizenship throughout our territory, we are trying to build a better life for the present generation and a brighter future for those to come."

This is an example of how one of the world's largest natural gas companies is taking an outstanding role as a good and respected citizen of a great area—the Gulf South!

Companies Vie for Georgia Natural Gas Markets

Georgia Natural Gas Co., of Albany, Ga., has applied to the Federal Power Commission for authorization to build a 335 mile pipe line project which would serve natural gas markets in southwestern Georgia and Tallahassee, Fla.

The proposed transmission system, estimated to cost $4,872,593, would connect with Southern Natural Gas Company's line near Phoenix City, Ala., and extend to Tallahassee, with laterals or branch lines serving the principal cities and towns in Southwest Georgia adjacent to the proposed line.

Georgia Natural also is seeking a Commission order directing Southern Natural to provide and sell an adequate supply of natural gas for the proposed line. Georgia Natural estimates its annual demand at 9,167,098,000 cu. ft.

Cities and towns to be served include Americus, Cordele, Albany, Moultrie, Thomasville, Bainbridge, Cairo, Quitman and Valdosta, all in Georgia, and Tallahassee, Fla.

The company emphasized that its application is not intended to be competitive with that of Atlantic Gulf Gas Co., which now has pending before FPC an application proposing to construct pipe line facilities which would carry natural gas to Georgia, Florida, South Carolina and Alabama. Georgia Natural said it was filing its application as an alternative proposal in the event that a certificate is not issued to Atlantic Gulf.

Another Contender

South Georgia Natural Gas Co., of Atlanta, is seeking Federal Power Commission authorization to build about 248 miles of pipe line to carry natural gas to distributors in southern Georgia.

The proposed system, estimated to cost approximately $6,600,000, would have a capacity of about 40,000,000 cu. ft. of natural gas per day. It would include a 144-mile line extending from a connection with Southern Natural Gas Company's proposed extension of its system in Talbot County, Georgia, southeasterly to Brooks County, Georgia. A series of eight lateral lines, totaling about 104 miles, would extend from this main line to various Georgia communities.

Communities proposed to be served include Americus, Cordele, Albany, Sylvester, Tifton, Moultrie, Thomasville, Quitman, Valdosta, Butler, Oglethorpe, Montezuma, Ellaville, Vienna, Dawson, Leesburg, Ashburn, Fitzgerald, Ocilla, Pelham, Camilla, Adel, Nashville, Cairo, and Bainbridge.

The application says that there is now no gas available to these communities other than LP. The proposed project would make natural gas available to approximately 186,650 people, the company said.

Plans Filed to Extend Service In Central Alabama

South Central Alabama Natural Gas Company, Inc., of Birmingham, Ala., is seeking Federal Power Commission authorization to construct approximately 150 miles of pipe line to carry natural gas to about 92,000 people in south central Alabama. Cost is $2,500,000.

The company also asked FPC authorization to connect its proposed system with, and to obtain natural gas from, Southern Natural Gas Company's line in Elmore County, Alabama.

South Central said the proposed system would have a design capacity of 15 million cu. ft. per day.

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CLEVELAND 17, OHIO

Holley Poe Becomes Partner In Edward W. Ackley & Co

E. Holley Poe, natural gas consultant and President of AMERICAN GAS JOURNAL, Inc., has been admitted as a general partner in Edward W. Ackley & Co., Boston, Mass.

The firm specializes in oil and natural gas securities.

Improved Pressure Control

(Continued from page 40)

lator is fitted with many adjustments which permit a high degree of flexibility and rangeability for all low pressure applications.

Elevating Low Pressure Systems to Intermediate Pressures

One of the greatest problems which is facing many gas distribution operators today is that of the possibility of changing a low pressure system to one of intermediate pressure. Undoubtedly greater progress has been made with complete success along this line during the past two years than at any time in the history of the industry. Several large properties have been successfully converted from inches of water column or ounces, up to one, two, five and even ten and 15 pounds distribution pressures.

There are many problems confronting the gas engineer in deciding the proper procedure to follow in making such a changeover, but the writer believes that the procedure which has been followed in some of the midwest areas recently sets a very desirable pattern. One large property, converted during the summer of 1949, installed approximately 45,000 regulators of the house service type on the riser ahead of each of their meters and had excellent results with the program.

Naturally, the necessary leak campaign preceded the actual installation of the service regulators, and then special regulators having special designed orifices and internal parts were installed on the system while it was still operating at 8″ wc distribution pressure. The regulators had to be so designed that they would handle 200 cu. ft. of gas per hour with not more than 2″ wc pressure drop and in addition the regulator had to be so designed that without any change or adjustment in the regulator, it would be entirely suitable for the elevated pressures when all regulators were installed.

This program has been carried out in several locations with excellent results and it has been found that with proper supervision at the time of the regulator installations, the pressure later can be elevated in steps up to the desired and necessary operating pressures with an absolute minimum of call-backs for adjustments in regulators and appliances.

The problem of installing a new service regulator in an old installation naturally presents a great many physical problems, and the regulator as shown in Fig. 5, the Fisher type, has proved to be exceptionally flexible for such an application. The two-piece body with the union connection enables the service man to break the union connection and install the valve body in the pipe riser, even though it is closely located to the wall, and then later assemble the regulator complete and have it in service in a very few moments.

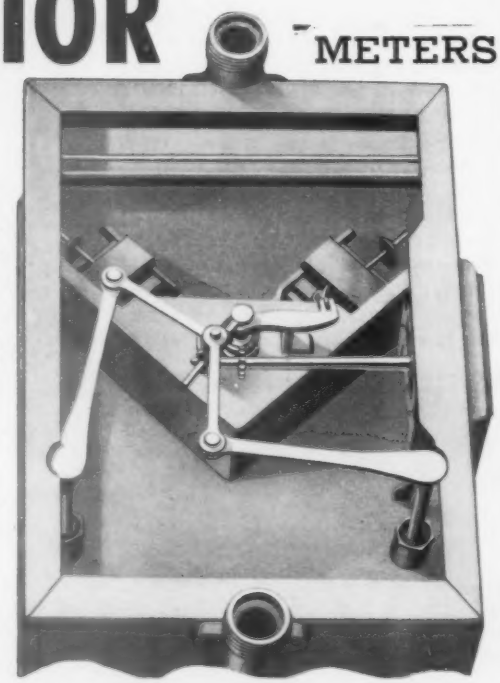
It is estimated that the cost of making such conversion installations for this type of conversion job, including all labor, material and installation costs, would amount to from $12.00 to $14.00 per installation.

Therefore, it can be readily seen that the economics of increasing the low pressure system up to an intermediate value are very attractive, when handled in this way, compared with the cost that would be involved for installing new and larger low pressure piping equipment in the distribution system.

There are many new and improved types of gas pressure controls which will prove of extreme value to the gas distribution engineer faced with increased gas send-out problems, due to the advent of natural gas. It is urged that the manufacturers of this equipment be consulted on individual problems. Undoubtedly they can save the utility a great deal of time and money.

SUPERIOR METERS

ALL THAT THE NAME IMPLIES



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Installing Services

(Continued from page 47)

cases by break-down of equipment, puncturing water mains and other minor emergencies.

You will note that the line-up of crews was different from that shown on Chart No. 4 which appeared in Part 1 of this article. The change of welding from the No. 1 to the No. 2 crew was necessary because we were unable to tow the pipe trailer behind the jeep. However, we believe that the prefabrication of the boring string on the No. 1 crew is still advisable.

The crews were somewhat handicapped being given a strange boring machine which went through rather rapid development during the test. If the final perfected machine had been available at the beginning of this work, the results would have been considerably different.

Conclusions

We believe the test results were satisfactory as far as the exploration of the

question of production line construction was concerned.

There are several points we should observe in future work. We should be certain that any procedure set up can be modified easily by the local foreman to fit his particular conditions such as installation of short stretches of main, wide separation of jobs, break-down of equipment, and the intervention of maintenance work.

For our West Coast conditions where we have rapidly developing territory, we believe the method offers the gas superintendent an important tool for taking care of sudden rises in his backlog curve. Sudden rises usually result from the completion of large subdivision projects which throw large blocks of work suddenly on the gas department.

The production method outlined allows the superintendent to add a "production head" on a standard crew which takes it out of the class of single job, hand operation, into the class of production line mechanized, which we hope will result in the doubling of the output per man.

Gas companies generally are operating companies and construction is an attendant necessity. We attempt to keep our crews to the size needed to furnish a "fire department" in case of emergencies and to carry on the base line block of our work. Sudden increases above the base line of our work then become overloads which cannot be carried. The production line method is particularly adapted to meet these peaks.

ADDENDUM:

For other papers on this subject by Mr. Currens see PCGA Proceedings Vol. 32 (1941) P. 111 and Vol. 37 (1946) P. 68.

Also Page 94, Volume 38, PCGA Proceedings 1947.

Also AGA 1948 Proceedings, Page 679, 30th annual meeting—"Mechanization of Gas Service Construction."

N. Y. State Natural Gets OK To Expand Facilities

The Federal Power Commission has authorized New York State Natural Gas Corp., of New York City, to expand its existing natural gas transmission system and underground storage facilities to enable it to meet requirements of its present customers in New York and Pennsylvania for the years 1951 through 1954.

The construction program, estimated at $2,592,500, includes 53.5 miles of 16 inch loop line in Pennsylvania extending from a compressor station in Greene County to another station in Westmoreland County. In addition, the company will replace several sections of pipe at two storage pools.

Northwest Hopes

(Continued from page 16)

tal transmission cost for deliveries in the United States of 35.6 cents.

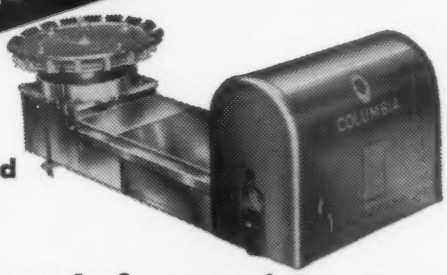
Other prospective pipe line interests opposing Westcoast stress the fact that the 35.6 cents does not include the field cost of gas, and that inclusion of this figure would raise the city gate rate in our Northwest to at least 40¢ per Mcf to United States distributors.

Since Westcoast Transmission Lines, Ltd., has made available the most complete exhibits of its plans, a summary of the data contained therein might afford the most valuable basis for an appraisal of the requirements and possibilities involved in a natural gas development for the Pacific Northwest.

The company contemplates a total of 1,570 miles of line (426 gathering and 1,144 transmission) to cost an estimated $113,794,000 on the basis of material costs prevailing in the United States in December, 1949.

Annual sales capacities are set at levels ranging from 34.25 billion cu. ft. in the first year, to 60.26 billion cu. ft. in the fifth year. Approximately 80 per cent of the total in each year is scheduled for United States markets.

COLUMBIA Model "J" Conversion GAS BURNER



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☐ Communities
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Legal Decisions

(Continued from page 24)

payment for gas consumed in the future. Then the gas company shut off the gas. Koontz sued the gas company for damages allegedly suffered by his family and himself because the company unlawfully discontinued service of gas in his home.

The higher court refused to hold the gas company liable and explained that the only testimony that may enable Koontz to recover damages from the gas company would be definite proof that the company's act of shutting off the gas was a coercive measure to force payment of Koontz's past-due bill which he had listed in his bankruptcy petition, that the cash deposit required by the gas company to restore service was unreasonable; and that proper notice was not given Koontz before the service was discontinued.

Jury Reduces Damages

Very frequently a jury will considerably reduce damage allowances or awards demanded by a gas consumer whose gas was illegally cut off.

For example, in Sibley v. Pett Realty Co., Inc., 41 So. (2d) 230, reported August 1949, it was shown that one Sibley filed suit and alleged that while he and his family were occupying a dwelling, a gas line running into their home was disconnected thereby depriving them of fuel for heat and cooking; that this act was committed at a time when the weather was very cold; that, as a result, at least three of their children sustained heavy colds, which confined them to bed for two weeks, and that the wife contracted influenza from which she suffered for three or four weeks. It was further averred that, in addition to the illnesses suffered, they sustained embarrassment, inconvenience and hardship. Accordingly Sibley asked for damages, amounting to $4,000, and proved that he received no notice before the gas was disconnected.

The case was tried before a jury and resulted in a verdict in favor of Sibley for the sum of $1,250.

In subsequent appeal the $1,250.00 damage award was reversed by the higher court. See Sibley v. Petty Realty Co., 42 So. (2d) 701, reported January, 1950. During this second trial new testimony was given to the effect that when the company contemplated laying a new gas line it notified Sibley that his house would *not* be connected with the new pipe line. In view of this evidence the higher court reversed the jury's verdict and held that Sibley could recover no damages. The higher court said:

"A different case might be tendered if, after supplying gas to Sibley, the lessor (company), without advance notice of his intention so to do, disconnected it with injurious results to the lessee or members of his family. But that is not the case before us. It is shown that the line was laid several days prior to being connected. Sibley must be held to have had knowledge of this fact and why the new line was laid, as it passed only a few feet east of his house. Mangham (company official) testified that he told Sibley that there would not be any arrangement for a connection between the house and the new line. From these facts, Sibley was put on his guard to meet the change in conditions then impending."

Must Sue for Damages

All gas companies' officials and employes should make note of a relatively late higher court decision rendered in favor of a gas company due to knowledge of the company's legal counsel of an important point of law.

For illustration, in Wheeler v. Inland Gas Corp., 211 S. W. (2d) 415, reported July 1948, the testimony showed facts, as follows: One Berry owned a tract of land and in 1928 he entered into a contract with the Inland Gas Corp. By the terms of this contract Berry gave the gas company a perpetual right to lay and

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CONVENTION CALENDAR

May

8-9 *A.G.A. Natural Gas Department*, Spring Meeting, Mayo Hotel, Tulsa, Okla.

8-11 *Liquefied Petroleum Gas Association*, annual convention, Palmer House, Chicago, Ill.

11-12 *Public Utilities Advertising Association*, annual convention, Kansas City, Mo.

16-18 *Pennsylvania Gas Association*, Galen Hall, Wernersville, Pa.

22-24 *Production and Chemical Conference*, Hotel New Yorker, New York, N. Y.

25-26 *Natural Gas & Petroleum Association of Canada*, annual convention, Prince Edward Hotel, Windsor, Ont.

28-30 *GAMA annual meeting*, The Greenbriar, White Sulphur Springs, W. Va.

June

6-8 *Edison Electric Institute*, annual convention, Atlantic City, N. J.

19-20 *Michigan Gas Association*, Grand Hotel, Mackinac Island, Mich.

20-24 *Canadian Gas Association*, annual convention, Murray Bay, Quebec, Ont.

26-30 *American Society for Testing Materials*, annual convention, Atlantic City, N. J.

maintain a gas line across his property. And the gas company gave Berry the right to tap the line at his expense and use gas from the line at a very low rate. It was further provided in the contract that the gas company would bury its line below plow depth. Due to certain soil conditions as rock, the gas company failed to bury its pipe line. No complaint was made by Berry as this time. Several years later the company was adjudged a bankrupt.

Sometime afterward the gas company disconnected the gas line running to Berry and another person named Wheeler. Then in 1947 the latter filed suit and asked the court to compel the company to furnish him gas as it does other customers along its line, and to require the company to bury its line below plow depth where same runs over his land. The higher court refused to do so, saying:

"It is seen that this action involves the use, control, maintenance and operation of the bankrupt's property. . . . Appellant does not ask for damage suffered by reason of the company's failure to bury its line, but he is seeking to have the court require the company to bury its line. To do this would not only cost the company out of all proportion to any inconvenience or damage appellant may suffer because of the line remaining on top of the ground, but it would stop, at least temporarily, a large flow of gas to many industrial concerns in the territory served by the company."

Rules and Regulations

All higher courts agree that gas companies may adopt reasonable rules and regulations which include turning off gas supply to delinquent consumers.

On the other hand, a property owner never is liable for payment of his tenant's water bill, unless a non-ambiguous state law or constitutional clause clearly states that he shall be liable. Hence a rule or regulation of a city or water company *not authorized by a state statute*, requiring a property owner to pay for gas used by another, as his tenant, is void. See Brass v. Rathbone, 153 N. Y. 435. According to a recent higher court a landlord cannot be held liable for the gas bills of his tenant unless a state law so provides. Hence, real premises cannot be made subject to a lien for gas charges unless a state law clearly authorizes such a lien. See White, 75 N. W. 314; and 171 Mass. 329, 40 L. R. A. 657.

Although a valid state law authorizes a city or gas company to cut off gas supply for violation of reasonable rules and regulations, or for non-payment of bills, the law is settled that the company may be liable for cutting off gas supply if the testimony shows that a *dispute* existed between the property owner or gas consumer and the gas company over the validity of a gas bill, or failure of the consumer to abide by company's rules and regulations.

In Little, 149, Atl. (2d) 820, the court said:

"Until the bona fide disputed right is settled, the consumer must be supplied as a matter of duty based upon public necessity."

Of course, this law is applicable only when the disputed bill may be decided in favor of the consumer.

For illustration, in Oklahoma Gas Co. v. Young, 116 Fed. 720, it was disclosed that one Young sued a gas company for heavy damages. She proved that in the winter the company's employee when knowing that she was sick and under the care of a doctor turned the gas off, and she contracted pneumonia.

During the trial the counsel for the gas company proved that although Young had promised to pay an overdue gas bill she failed to do so.

The higher court held the gas company not liable, saying:

"A gas company may, in the discharge of its duties to the consumer, govern its action by reasonable rules and regulations, ... It follows as a matter of law the plaintiff (Young), not having

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complied with the reasonable and legal demand of the appellant for the payment of the overdue account at the time the gas was turned off, was in no position to demand that service be continued."

Meter Performance

(Continued from page 28)

are not much different except for the first two or three years of service when the DRs are a relatively greater number. It will be noticed, by reference to Fig. 2, that the per cent of accurate meters improves after seven years in service except for over 10 years.

Ten year meters, however, show a smaller per cent accurate than meters with less years of service. The reason for this is that more changes were being made in divisions which had been supplied with meters with new diaphragms or reoiled diaphragms in 1940. These show a poorer over-all performance than meters which had either the AA or A repair on the former visit to the shop. In addition to this the meters in some acquired properties, while relatively few in quantity, show a much poorer performance. This tends to pull down the general average.

There is a pronounced drop in accurate meters, and a corresponding increase in fast meters, for the over-10-years group. Ten years happens to be the breaking point between the old type of repairs and the new type. It was stated earlier that the new procedures were not in full operation until about the end of 1939.

With respect to the costs of changing and repairing meters under a seven year periodic change program as compared to a 10 year program, it is estimated that in the Southern California Gas Co. the 10 year program will cost about one-third less than a seven year program. This ratio applies to both the cost of changing and the cost of repairing. When large quantities of meters are involved, the saving in a 10 year program over a seven year program is quite an imposing figure.

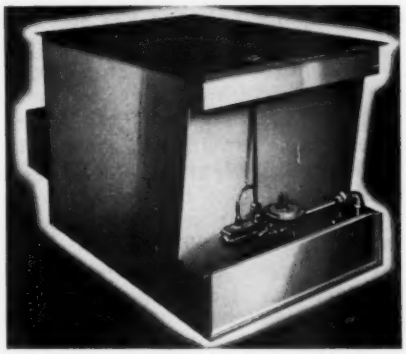
In summary, the data presented indicate:

1. When dry natural gas is available, do not try to humidify.
2. Set proof of outgoing meters to compensate for speed-up which will occur soon.
3. Do not disturb diaphragms unnecessarily.
4. When meters are open, put top mechanism of meter in good condition for long service.
5. These factors, when properly handled, should lead to better meter performance over longer test periods and result in important money savings in meter maintenance.

New Floor Furnace Announced By Bryant Heater

Bryant Heater division, Affiliated Gas Equipment, Inc., Cleveland, has released information on its new model 365 floor furnace.

It is a factory assembled, gas-fired unit designed for suspension at floor



level. The overall depth is 25". The lower six inches of the casing is water proof for protection of controls and burners. Available in three sizes of 35, 50 and 65,000 Btu per hour input, the 365 employs a "complete gas shut-off" feature. The homeowner has a choice of manual or fully automatic controls, and a floor type or dual-wall register.

J & L Awards Koppers Contract For New Coke Oven Battery

Jones & Laughlin Steel Corp. has awarded Koppers Co., Inc., a contract to construct a new battery of 59 coke ovens at its Aliquippa, Pa., works, according to an announcement by Joseph Becker, vice-president and general manager of Koppers Engineering and Construction Division.

The 59-oven battery will be of the Koppers-Becker underjet type, like two 106-oven batteries completed by Koppers in recent years for J & L.

Cost of the new ovens and the extending of J & L's steam generating and coal handling equipment will be in excess of $4,000,000, and all the work is expected to be completed early in 1951.

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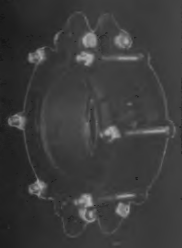

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Luther S. Williams Dies

Luther S. Williams, who was President of the Harrisburg Gas Co., Harrisburg, Pa., at the time of his retirement in 1930, died on Mar. 26.

Mr. Williams entered the gas business in 1886 at Paterson, N. J., where he was assigned by The United Gas Improvement Co. He also worked with UGI subsidiaries in Allentown and Titusville, Pa., and Sheboygan, Wisc. He came to Harrisburg as assistant superintendent in 1899. In 1927 he was made vice-president and general manager, and later in the same year was elected President.

He was the first President of the Pennsylvania Gas Association which office he held in 1909.

Financial Front

(Continued from page 26)

be open for you to do common stock financing if that best fits your picture. Then we might consider for a moment the question of how to undertake it. In some companies offerings of new stock to present stockholders under pre-emptive rights may be required by state law or charter provisions or both. In the absence of such requirements the question may arise as to whether to make the offering voluntarily through rights to existing stockholders or through an underwritten offering to the general public. There is not necessarily a definite answer to this question as there is something to be said on both sides. Obviously, rights involve a certain expense and nuisance which you might like to avoid. On the other hand, if your stockholder relationships have been well cultivated over the years, you can count on a certain degree of loyalty from your stockholders in making additional purchases when you present the opportunity.

If you issue rights I urge you to consider seriously the payment of commissions to dealers for getting the rights exercised. There is gain to the companies in having the dealers work for them and the dealers are entitled to fair remuneration for the services they perform. Many of you, whose chief contacts are with big investors, may not realize what goes on with the small investor who has bought a stock on the recommendation of his security dealer. He is very likely to take the rights to that dealer and ask his advice as to whether they should be exercised. If the dealer advises that they be exercised, he is likely to tell the dealer to attend to the details with the result that the dealer spends time and incurs actual out-of-pocket expense which, in the absence of a commission, is a dead loss to him.

There is a question as to the price at which the rights offerings should be made as related to the prevailing market price. Here again, the state laws are operative in some instances. If the company is a free agent, there is a problem as to whether the offering should be at the market, somewhat below the market or considerably below the market. Of course, the offering can be safely made at the market only if it is underwritten. Of late some offerings have been made at just about the prevailing market price and I can report considerable ill-will created among stockholders. Upon receiving the rights they felt they had a privilege of some value and were quite disillusioned and disgusted when they found the rights had little or no worth. There is an objection to pricing rights substantially below the existing market in that such a policy tends to destroy some of the market value of the stock as the operations of arbitrugours may depress the price and, secondly, an investor who decides to sell his rights may do so and look upon the proceeds as a generous extra dividend, not realizing that, in effect, he has sold a part of his capital investment. My feeling is that a middle course is best and that rights may be priced a little below the market.

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say 10 per cent or 15 per cent, with complete satisfaction to all concerned.

Some companies have successfully used the over-subscription privilege. This device permits holders to enter subscriptions for stock in addition to that to which their pre-emptive rights entitle them, such additional subscriptions being accepted subject to allotment.

While on the subject of raising common stock equity I wish to touch on the controversial matter of building up the equity by retaining earnings in the business. Here we have two schools of thought. One group feels that if a company is faced with a substantial construction program, one good way to raise some of the money in painless fashion is to hold dividends at a modest figure and plough back a maximum amount of earnings into the business. The other group feels there is more to gain by paying attractive dividends to stockholders and then raising the necessary equity money by offering more stock. I said the matter is controversial but I am glad to state my feelings unqualifiedly. I have watched both philosophies in practical operation and cast my vote unhesitatingly on the side of liberal dividends.

The market for utility stocks is more sensitive to dividends than to earnings. A big reason for this is that the investor who buys operating utility common stocks generally is a conservative individual, interested to a considerable extent in income rather than speculative gains. If the purchaser is interested in income, he is willing to pay more for those earnings which come to his door quarterly in the form of a check than he is for earnings ploughed back for reinvestment. Furthermore, since the earnings are his, he would welcome the opportunity to decide, himself, whether to reinvest them. Some companies seem strangely reluctant to raise their dividend rates despite earnings which would seem to warrant higher disbursements. Obviously, it is impossible to set a figure which is universally appropriate as to the proportion of earnings which should be disbursed as dividends, but I do urge you to review your own situation to see whether you are playing fair with your stockholders.

To some of you this matter of financing may be reopening a book which has lain closed for a long time. Many of you have been able to take care of your financial needs in recent years from depreciation and retained earnings. At least, you may not have had to do equity financing for a while. If you now face the possibility, you may realize that you have not been giving as much attention to your stockholder relations as perhaps they deserve. Self-interest, if nothing else, dictates that you should have a program well organized and consistently pursued in respect to stockholder relations, just as you do with employee relations and customer relations. I know that some of the companies represented here have done an outstanding job in this respect and I highly commend them for it.

One of your principal media for keeping in touch with your stockholders is your annual report. Let me urge you to prepare this in such form that it gives your stockholders a clear picture of what is going on in your company. I do not necessarily advocate the spending of as much money as some companies put into their reports from the standpoint of photography and attractive lay-out but I do plead for full facts, figures and some reasonable indication of what the future holds. Furthermore, once a year is not often enough to get a report from a company which is using your money and I would like to suggest some form of condensed quarterly report to go out with dividend checks. Beyond this, I would urge you to cultivate through personal contact your large stockholders and the investment dealers and institutions who are most likely to be called on for information about your company.

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2 H.P. Gas Fired Pressing machine boiler. 100 lbs. ASME Code.

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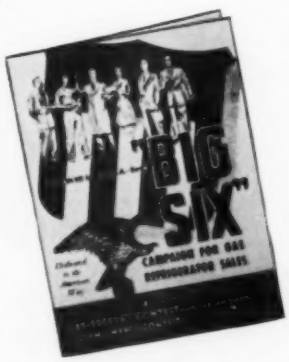
Nearly a half century of service to the Gas Industry.

Safety Gas Main Stopper Co.
523 Atlantic Avenue, Brooklyn, New York

There's plenty to gain in the "Jet Freeze" campaign!



Dedicated to the American Way, the "Big Six" Campaign honors the six vital partners in our American system—the manufacturer, the scientist, the worker, the businessman, the salesman, and the consumer. The American Way has always been the Best Way. Let's prove to the world that it's *still* the Best Way.

Enthusiastic selling means a bonus gas load for you!

There have been great contests before. But never one to match this colossal, new "Big Six" Campaign. And kicking off the first half of this Big Push is the exciting "*Jet Freeze*" Contest—under way in April and lasting through May and June.

More prizes, more awards will be offered than ever before. And there's nothing like rich, rich rewards to pep up your salesmen . . . to give them incentive, enthusiasm, spirit . . . to have them "up" for every sale . . . to inspire them to make *extra* sales. And extra sales spell *extra* gas load. So make sure your salesmen are registered.

For outstanding sales efforts, there will be all-expense-paid Victory Vacation Flights . . . 588 cash awards . . . handsome merchandise prizes . . . trophy statues and plaques . . . desk-top trophy sets.

And for the first time, everyone will be competing on a *regional* instead of a national basis. Variations in rates, climate, and business conditions will have much less effect. "Big Six" promises to be the greatest campaign ever. So let's get behind it. Schedule local ads and promotions . . . give all the support you can. Remember *you're* in the spot to benefit most.

Serwel

The GAS Refrigerator

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